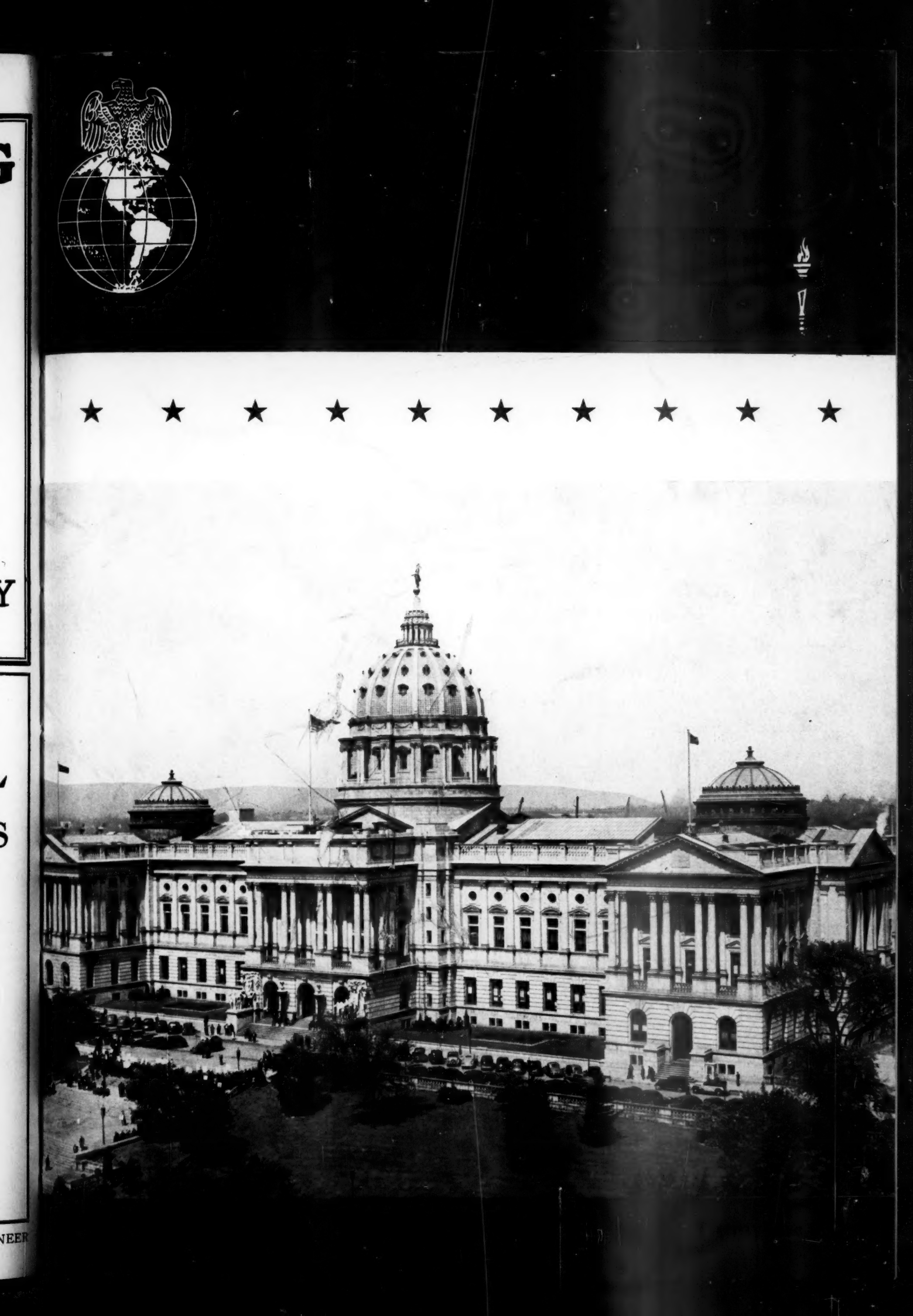

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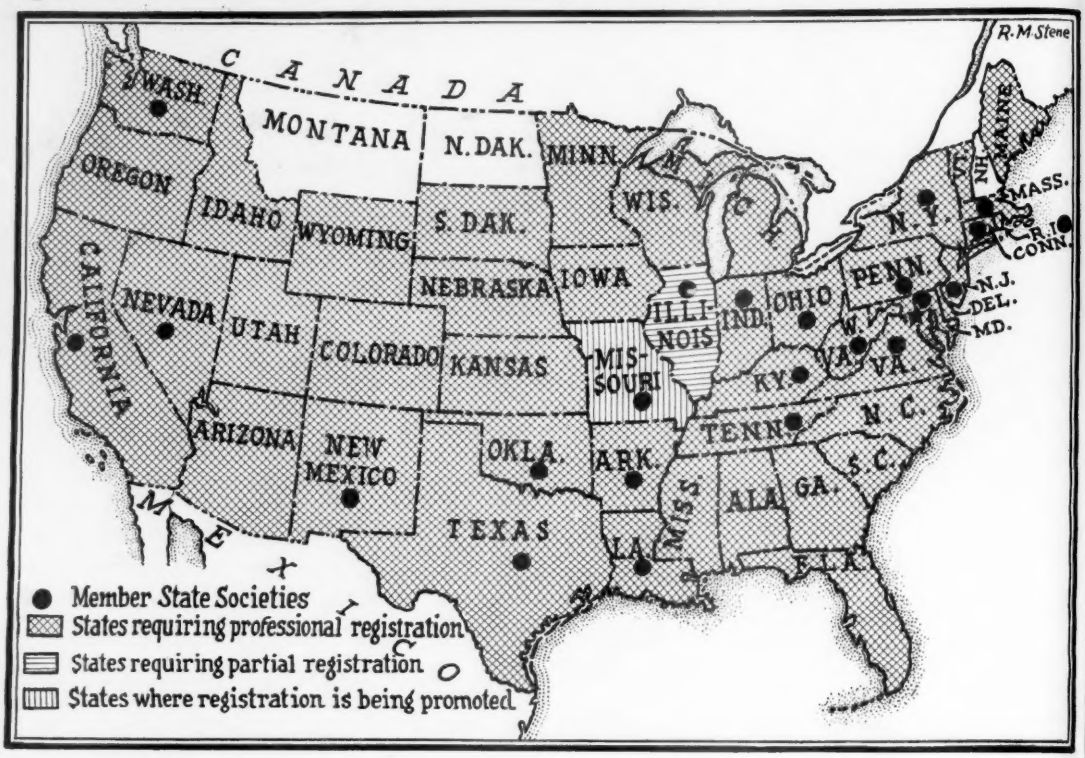

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THE COVER

Photo by Brown Studio, Harrisburg, Pennsylvania

Our cover picture this month shows the main capitol building of the Commonwealth of Pennsylvania. It is the first of a series in which we hope to include all of the States having membership in the National Society of Professional Engineers.

We dedicate this issue to Pennsylvania, not because of any preference, but because of the accessibility of the cover picture.

If you have a favorite view of *your* State Capitol, send us the photograph, or let us know where we may secure it.

The American Engineer assumes no responsibility for statements or opinions expressed by contributors. Their names identify the source of the same.

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EDITORIAL • • •

What is a Planner?

Very recently we sat with a body of citizens, a regional planning committee, and listened to an experienced Planner from one of the large mid-west cities tell of the accomplishments of his municipality. Because a long term plan, conceived some years ago, was taken by the citizenry as the accepted program, this city is almost free from debt, has splendid recreational facilities, good roads and parks, and is one of the better places to live in our nation.

But what is a Planner? And what basic training is necessary to become a Planner?

The Planner, to whom we listened, belittled the attempts of Engineers to plan, stating that their efforts only resulted in confusion. We remained quiet, and did not make an issue of this statement.

Recently, at a state convention of Architects, a speaker urged that Architects take up this field of planning, as it was logically their field, and as they were the ones who had the proper training in the relationship of society to its environment.

Our Engineering Society conventions have heard addresses by those who urge the Engineer to become the Planner.

Harvard University is offering courses in Regional Planning under the Graduate School of Design. Its catalog contains the following:

> "Regional planning is comparatively new as a profession and the number of men who are adequately trained to practise it is much smaller that the present demand.
>
> Regional planning may be defined as the application of foresight and intelligence to the development of human environment. Its final purposes are of course social; its consideration of efficiency and costs are economic; and the processes by which its findings are shaped and given the authority of the community and then administered are governmental and legal. Yet in its special dealings with man's environment, regional planning is broad physical planning, and thus most closely related to engineering, architecture, and landscape architecture."

Planning in the minds of the public, is a relatively new art or profession. It is certainly not a science, yet the practitioner should be equipped with the background of a scientific training. He should certainly have a knowledge of engineering, architecture, economics, government—and some knowledge of the law relating to municipal government and planning.

An engineering training can lead, as readily as any of the other professional trainings, to the further experience and knowledge necessary to become a Planner. Possibly our expert who addressed us had in mind those with a strictly scientific training in engineering, who suddenly attempt to branch into planning without acquiring the other necessary experiences. Certainly, the Engineer should not be ruled out as a Planner simply because he is an Engineer, for there is no better broad base for experience in planning than fundamental engineering training, followed by business and governmental experience.

We urge upon Engineers to consider the field of planning as a legitimate outlet for the Engineer's ability. But do not enter it without the broad training necessary in addition to the pure engineering.

ROBT. HALL CRAIG
Editor

Minutes of Meeting of the Board of Directors of the National Society of Professional Engineers

Held in Columbus, Ohio, on February 9, 1940

Sultan G. Cohen, Presiding; H. J. Darcey, Acting Secretary.

Present:—

Sultan G. Cohen	Alfred E. Roche
J. W. Beretta	Samuel I. Sacks
W. L. Simpson	H. Helland, (Rep. Texas)
L. E. VanAllen	H. J. Darcey
J. H. Morgan	John C. Riedel
G. F. Randolph	

Mr. Rockaway of the Cincinnati Convention Bureau expressed regret that the Society did not meet in his city as planned, and hoped that a future meeting would be held in that city.

Motion made by Mr. Roche to have Mr. Randolph proceed with the reading of the report of the Constitution Committee. Seconded by H. Helland. Carried.

Mr. Randolph reviewed the workings of the Committee during 1939 and outlined the results of an informal meeting held on February 8, 1940.

Mr. Beretta made a motion to receive the Report of the Constitutional Committee without implying approval of the report. Seconded by Mr. Randolph. Carried.

Motion by Mr. Sacks that the Committee Report be considered section by section, for acceptance, rejection or amendment, and that the results of such action be submitted to the membership as the recommendation of the Board of Directors for the revised constitution. Seconded by Col. Simpson. Carried.

Motion made and carried to accept the "Preamble" as read.

Motion made and carried that Article I as read be accepted.

Motion made and carried that Article II be accepted as read.

Motion made and carried that Article III, including the introductory paragraph and Sections A, B, C and D, be accepted.

Motion made and carried that the last paragraph of Article III be accepted as amended.

Motion made and carried that Article III as amended be accepted.

Colonel Simpson verbally authorized Mr. Beretta to serve as his proxy for District of Columbia and Maryland.

Motion made and carried that Article IV be amended as read.

Motion made and carried that Article IV as amended be adopted.

Motion made and carried to delete Article V as submitted by the Committee.

Motion made and carried to change number of Article VI to Article V and to adopt same as read.

Motion made and carried that Article VII be rejected.

Motion made and carried that Article VIII be changed to Article VI and be amended as read.

Motion made and carried to adopt Article VI as read.

Motion made and carried to change Article IX to Article VII and adopt same as read.

Motion made and carried that Article X be changed to Article VIII and be adopted as read.

Motion made and carried that Article XI be changed to Article IX and be adopted as read.

Motion made and carried to reconsider action on Article V.

Motion by Mr. Sacks that the following be added to Article V:

> "The Officers and Directors shall take office on January 1 next following their election and shall hold office until the following January 1st or until their successors have been duly elected."

Seconded by Mr. Beretta. Carried.

Motion made and carried that Article XII be changed to Article X and be adopted as read.

Motion made and carried that Article XIII be changed to Article XI and be amended so that wherever the figures 500 appear they be changed to 200.

Motion made and carried to adopt Article XI as amended.

(Board recessed until after evening session.)

(Reconvened at 10:30 P. M., February 9th.)

Present: Messrs. Roche, Cohen, Van Allen, Morgan, Randolph, Sacks, Beretta, Helland, Riedel, Darcey. Mr. Riedel presiding.

Motion made and carried to change Article XIV to Article XII and to amend same as read.

Motion made and carried to change Article XV to Article XIII and adopt same as read.

Motion made and carried to change Article XVI to Article XIV and adopt same as read.

Motion made and carried to accept the constitution as amended and submit same to the members as the revised charter of the Society.

The Report of the Treasurer was read by Mr. Sacks. Motion made and carried that the report be received and placed on file.

Mr. Randolph suggested that each State Secretary be requested to submit a corrected list of all members of N. S. P. E. as shown by their records to be in good standing.

Report of the Secretary was presented. Motion made and carried that the report be received and placed in the files.

Motion made and carried that the Chair be authorized to appoint a committee of three to draw up a budget for the coming year.

President Riedel appointed Mr. Sacks, Mr. Beretta and Mr. Randolph.

Motion made and carried that the checks forwarded to muhlen be audited by an auditor Mr. Zurmuhlen might select, and that the Society pay for this audit, when report is received.

Motion made and carried that the checks forwarded to Mr. Riedel by certain members of the Society be returned with a letter expressing the thanks of the Board for their willingness to assist.

Motion made and carried that the invitation of the City of Chicago for the Society to hold its 1941 Convention in that city in conjunction with the Illinois Society be accepted.

Motion made and carried that the Board go into executive session to consider the appointment of an Executive Secretary.

Motion made and carried that the President be empowered to engage an Executive Secretary at a salary not to exceed $4,000 per annum.

The Board adjourned subject to call of the President.

H. J. DARCEY,
Acting Secretary.

Are Written Examinations Justified?

A report presented by Charles T. Olmsted, Secretary of the Michigan State Board of Architects, Professional Engineers and Land Surveyors, at the most recent meeting of the National Council of State Boards of Engineering Examiners

Qualifying applicants for engineering registration has raised many questions and provoked much discussion as to the method and application to be followed. In a supplement to the report of a special committee on "Uniform Examinations" presented at the annual convention of the National Council of State Boards of Engineering Examiners, held in San Francisco in July, last, the committee chairman, Mr. Charles T. Olmsted, Secretary of the Michigan State Board of Architects, Professional Engineers and Land Surveyors, presented his own views. In this supplemental report Mr. Olmsted asks and answers three interesting and important questions as follows:

* * * * *

"1. Is engineering a profession and to what is a Board certifying when it issues a registration certificate to an applicant?

"If engineering is not a profession and is only a more or less loose conglomeration of technical trades, the object of an examination would apparently be to test the applicant's knowledge of the things he has been doing as an apprentice. The examination would be of the type given to a stationary engineer before issuing him a license to run a power plant, or it might be similar to a government civil service examination for the position of structural draftsman. On the other hand, if engineering is to be considered a profession on a par with the professions of law and medicine, it seems to me that the object of the examination should be to determine whether or not the applicant has the ability to analyze engineering problems. I do not believe that a registration certificate is a license entitling the holder of it to design bridges, or sewers, or power plants. On the contrary it is a statement from the Board that the registrant, by reason of his education and experience in the principles of engineering, is a proper person to practice that profession. Naturally it does not imply that the engineer has the ability to handle any assignment in the whole field of engineering. It does, however, assume that he has a knowledge of the fundamentals which will enable him to appreciate the problems involved and to decide what assistance he he will need from others. In other words, the object of an examination is to help the Board find out whether or not the candidate has an engineering mind. It is not a test of his ability to memorize facts nor is it an examination of the degree of skill he has acquired in performing the particular job he has been doing since he graduated.

"2. What should be the nature of the qualifying examination?

"Obviously the type of examination should be that which best accomplishes the purpose of examinations. Opponents of examinations say that recent graduates pass them readily while men of experience many years out of college do not, thereby proving the worthlessness of examinations. All I can say to that argument is that if the statement is true they were not the right type of tests. I believe the questions should be, so far as possible, in the form of specific problems to be analyzed, not questions which can be answered by 'yes' or 'no,' and not problems which can be worked by hunting around in a handbook for a formula in which to substitute the given data. The candidates should be allowed to use all the books and notes they wish to bring with them. In fact, the conditions under which they take the examinations should be, as nearly as possible, the same as in their own offices, except that they should not be allowed to seek help from other people. What portion of the examination should be fundamental and what part professional in character depends, I believe, on what we mean by fundamental. If we interpret a fundamental question to be one which it would be reasonable to expect any qualified engineer to answer, I would be willing to have the entire written examination fundamental. In other words, I believe that if we can satisfy ourselves by an examination that a candidate is well grounded in that kind of fundamentals, we can rely upon his experience record supplemented perhaps by thesis that he is well qualified professionally.

"3. Why not exempt from the written qualifying examinations engineering graduates from accredited technical colleges and universities?

"The Engineers Council for Professional Development has a gigantic task on its hands when it attempts to investigate the faculty and equipment of the engineering colleges for the purpose of accrediting their various curricula. Surely no one thinks for an instant that when the investigating committees accredit an institution they automatically put the stamp of approval on all of its graduates. I do not believe anyone would accept membership on these committees if he were called upon to go that far. Presumably it might be possible to determine what percentage of the graduates of a college were acceptable, but if we were to have any accredited colleges at all, we would have to be content with much less than a one hundred per cent score. When an engineer accepts bids from contractors, he may allow only reputable firms to compete, but that does not mean that he is going to dispense with inspectors. It is not necessarily a criticism of engineering colleges to say that all graduates are not qualified to practice as professional engineers. Many of them, in fact the majority of them, will find positions in other lines and it is to be hoped they will have successful careers. After all, engineering students are undergraduates and it is ridiculous to assume that all who graduate will be of professional calibre. Finally, we have very good precedent for the general policy of examining any and all candidates regardless of whether or not they possess college diplomas. Bar examinations and Medical Board examinations are nearly universal throughout the country and the applicants who take them generally possess two diplomas. Furthermore, it is not assumed that because they are graduates of professional schools they know all about their fundamentals. They are examined in the general subjects of law or medicine. Apparently the boards are satisfied that if they can pass the general examinations, it will be quite all right to let them pick out their own particular specialties in which to practice. There is no more reason why we should give different examinations to paving engineers, petroleum engineers, illuminating engineers and the hundred and one other kinds of engineers than why the medical boards should give different examinations to pediatricians, obstetricians, and the thousand and one other kinds of physicians.

"I should be the last person to claim that the examinations we have been conducting in Michigan for the past twenty years have been adequate for the purpose. However, I do believe they have proven the necessity for examinations and that it would be inadequate to exempt graduates. I have attended every meeting of the Michigan Board during those years and I shudder to think of the hours devoted to the hundreds of grandfather applicants. I have heard people speak at the meetings of the National Council of State Boards of Engineering Examiners about pre-eminent engineers with years of experience whom it would be ridiculous to subject to written examinations. We have had our share of such applicants and I agree that we can well exempt such men, but where we have had one of them we have had scores of others, graduates of our best accredited schools, who could not have passed any kind of an examination, no matter how lenient the examiner might be. However, such men often have plenty of friends who are willing and eager to write glowing accounts of their accomplishments and if it so happens that no one says anything against them, they are bound to be approved by a Board. Everyone knows how difficult it is for a Board to always justify its decisions. It passes A on his record and turns down B. Then B complains and says he has been treated unfairly, and that he is just as good a man as A, in fact a whole lot better. B's friends take it up and write letters and see the Governor and make a big fuss. Very likely the Board finally gives in and registers B, for it probably has a sneaking idea that B is right and that it made a big mistake in passing A in the first place. How much better it would have been to have been able to tell B that he might be as smart as A but that unless both of them could improve their grades about a hundred per cent they better not bother the Board any more. Of 550 engineering college graduates who took Michigan Board examinations between 1920 and 1934, 43.3% passed the first time, 17.8% passed on the second trial, and 16.7% more finally qualified after an average of 3.5 trials. Of the 22.2% who never qualified, about half of them tried an average of three times and the other half never tried again after the first time. The average age of the men who passed the first time was twenty nine years and they had been out of college an average of 4.8 years. The men who did not pass the first time averaged 29.4 years in age and had been out of college an average of 4.7 years. Those who never passed after an average of three trials had been out of college an average of four years.*

"Seniors have been allowed to take the so-called fundamental part of our examination at the time they graduate. Of 243 seniors, 46.5% passed the first time, and 63.3% of them finally passed after one or more trials. Forty-eight engineering colleges are represented among the graduates and seniors who have taken our examinations and with possibly three or four exceptions I should say they are all on the list of colleges accredited by the E. C. P. D. To my mind the most significant figures brought out in the study of the results of our examinations were the percentages passed after the second trial and the total percentages still failing after several trials.

(Continued on page 25)

The Need for Greater Appreciation of the Value of Engineering Service

BY RALPH B. WILEY

Head, School of Civil Engineering, Purdue University

In July, 1929, Dean Anson Marston in a presidential address before the American Society of Civil Engineers (Trans. Am. Soc. C. E., Vol. 93, p. 1736) discussed the definition of engineering and the nature of the engineering profession. He recalled the original definition proposed by the Mining and Metallurgical Society of America in 1927:

> "Engineering is the practical application of scientific methods to the utilization of the resources of Nature for the use of Man."

and its amended form:

> "Engineering is the application of scientific methods to the utilization of the resources of Nature."

Engineering is a very broad field but these definitions took in altogether too much territory. Under them the apothecary and physician in the preparation and administration of drugs could logically be classified as engineers. Recognizing this defect in the definition, Dean Marston proposed:

> "Engineering is the science and art of directing applications of the science of mechanics in the economic utilization of the forces and materials of nature."

He pointed out that "the significant phrases in this suggested definition are: 'Science and Art'; 'Science and Art of Directing'; 'Applications of the Science of Mechanics'; 'Economic Utilization'; 'Utilization of the Forces and Materials of Nature'; and 'Forces and Materials of Nature' . . .

"The phrase 'The Science and Art of Directing' restricts engineering to the professional phrases of mechanic arts work . . .

"Engineering differs from the other great professions mainly in that the engineer is unique in his close and vital relations to hundreds of millions of persons engaged in pursuits closely allied to his profession. It is easy to make the distinction between the apothecary and the physician, or between the bailiff and the lawyer, but it is not so easy to draw a sharp line of separation between the highly skilled mechanic arts master workmen and the professional engineer. This is because engineering is both a science and an art.

"Science is classified knowledge: 'art is that which depends on practice and skill in performance.' 'In Science, we know that we may know; in art, we know that we may produce' . .

"In Tredgold's day (1827), almost all English engineers had risen from the ranks of master workmen, and it was natural for him to refer to engineering as only an 'art.' Since Tredgold's time, there has been a very extensive development of the scientific aspects of engineering knowledge and qualifications, which I have come to believe should be recognized by defining engineering as both a 'science' and an 'art.' While engineering is based on certain phases of the physical and mathematical sciences, there is a body of real 'engineering science,' consisting of certain highly specialized developments (dealing almost wholly with engineering problems) of the physical and mathematical sciences. Engineering mechanics, the theory of structures, and the theory of machine design are good illustrations. The physicist, the chemist, the biologist, the mathematician, would have to become engineers to become qualified to develop and advance modern engineering science.

"More and more universally in modern engineering, empirical methods and solutions of engineering problems are found insufficient and unsatisfactory. No engineering problem can be considered solved satisfactorily until a sound theory of its solution is discovered."

The phrase "Application of the Science of Mechanics" covers all of the mechanic arts as distinguished from the fine arts. It runs the gamut from air brakes, automobiles, through communication, construction, power, transportation, utilities to zoning.

"Economic Utilization" requires the engineer to make "two blades of grass grow . . ." or "one dollar do the work of two." It is today recognized as a basic requirement of good engineering practice.

Engineering does not include the utilization of all of the forces and materials of Nature, some are included in agriculture and in medicine, but only those within the realm of the science of mechanics. This, however, is ample for a single profession, involving as it does research, design, construction and operation.

One striking feature of the engineering profession is diversity. It cannot isolate itself from the affairs of men, in fact it deals with many of the functions of the social order in a highly complex manner. Society today is more directly dependent upon sound engineering and engineering competence than ever before. Furthermore engineering is directly related to our economy, not only technically but also administratively, and even commercially in a way that has in the past caused severe economic loss because that fact has not been more fully recognized.

Because the field is so broad there are many grades of responsibility, professional, sub-professional and in some cases non-professional. It varies from the profession to the vocation on the one hand and from pure research to commercial business on the other.

The Indiana registration law states that "the practice of professional engineering . . . means any professional service, including consultation, investigation, evaluation, planning, design or the responsible supervision of any construction or operation in connection with any public or private utility, structure, building, machine, equipment, process, works or project, wherein the public welfare or the safeguarding of life, health or property is concerned or involved, when such professional service requires the application of engineering principles or data."

Membership requirements in the great national engineering societies are not only ability to direct but also to conceive or design engineering works. Experience in responsible charge of important work with emphasis on responsible and important are prerequisites to admission.

The preparation of the engineer is rigorous. He must have sound technical training particularly in the natural sciences, mathematics, physics and mechanics. He must acquire a wide background of knowledge, the ability to think clearly, imagination to conceive and articulateness to

tell and convince others. He must develop a sense of values and critical judgment, not merely to sort out ideas and sift them down to their fundamental assumptions, but he must have a basis for judgment of the assumptions themselves. Sound technology is not sufficient. Every new structure, machine, or process must first be conceived in some one's brain and then be depicted and described before it can be considered by others. The engineer must be able to analyze a problem, break it down into its elements, secure and select the right data and, by the application of fundamental laws, reason logically to a definite conclusion. Then he must be able to explain his data, methods and conclusions to others and convince them that his solution is sound. Sentimentality has no place in his mind. He first deals with hard facts and logic. He then deals with men. He must be convincing and to be convincing he must be right.

"Economic utilization" is the justification of his work. No solution is sound that is not based on sound economic principles. This does not mean that every project must pay dividends in cash, they may be paid in some other form but the values must be there. Furthermore, all engineering work must be financed and the engineer is confronted with ways and means, so his projects must be sound financially. In many cases his work is involved in litigation or requires special legislative action to permit its fruition. He must present his arguments convincingly.

The engineer proves his case by a clear analysis based on facts and the ability to do so and the judgment necessary are applicable to other fields such as administration, management and finance. If his training is thorough he respects the truth and he develops a deep-seated honesty of purpose.

The psychologist tells us that learning is not transferable, that we may learn to add, multiply and divide but that learning does not help us to do other things such as conjugating Latin verbs. This is probably true but on the other hand there are many thought processes highly developed in an engineering training which are of great and direct value in industry, business and finance. Cold logic, absence of sentimentality or prejudice, ability to collect data and analyze, good judgment are of prime importance in any field. The management of any project, engineering or business, calls for the same type of analytical ability and judgment.

This is essentially an age of technology and this fact has a direct bearing on our social order and upon government itself. This effect requires the same sort of understanding as that acquired in an engineering training. Statecraft is a field for the engineer because it is daily dealing with problems only the engineer is equipped to solve. The engineer is greatly concerned with the new emphasis of government.

Generally speaking the engineer's training in the fundamental sciences is good. He has learned to think clearly and he has developed his imaginative powers to a high degree. He does not react to nor does he rely upon sentimentality. If there is any lack it is in his inarticulateness, his inability to deal with his fellow man, his lack of political acumen and in some cases his lack of a sense of social responsibility.

It is hopeless to attempt to think without words. We think in words and our thinking is strictly limited by our vocabularies. We cannot think about area moment or sanitation or entropy if we don't know the words or what they mean. Our logic is bound down by the vehicle through which it is expressed. A limited vocabularly means a limited ability to think. Furthermore an idea is useless unless it can be interpreted and explained. Therefore it behooves us all to look to our English.

No one, especially no engineer, can live to himself alone. Engineering projects are developed only through the cooperative efforts of many, therefore the engineer should attempt to understand the psychology of his fellow man. He should learn the problems of others, their reactions to various stimuli, how they think, and the best approach to their minds. He should also see to it that those with whom he comes in contact understand his problems, his viewpoint and his conclusions and the reasons therefor. To this end he should develop a sound sense of fundamental values, otherwise his judgment will be warped.

Politics, the science and art of government or more definitely the theory or practice of managing or directing the affairs of public policy, affects us all but its impact on the engineer and his work is direct and sometimes devastating. The engineer should concern himself more than ever before with this field of activity. Using the word in its broadest sense it has to do with our relations with our fellow men in any undertaking be it government, an engineering project, an industry or a business. Political acumen is almost necessary for success in this day and age. Some able engineers have failed for lack of it.

The engineer is directly concerned with the social order. He has been blamed, justly or unjustly, for "technological unemployment." Reemployment is dependent very largely upon his activities. He should, therefore, develop a sense of social responsibility, not of the "I am my brother's keeper" type but rather of that robust type which looks upon the solution of social problems such as unemployment as his responsibility and turns in with a will to do his bit for the body politic. His mind is trained for this activity, his lack of bias prevents sloppy thinking and wrong conclusions. The public has lately become aware of the technological character of our civilization and while in the past it has accepted engineering accomplishment without much thought it has recently become engineering conscious and therefore looks to the engineer for direction. The engineer who has long been recognized for his high technical proficiency should now display comparable social competence and understanding.

Since the professional engineer is well trained technically it goes without saying that positions requiring that technical training should be filled by engineers. Unfortunately this is not always the case. In many instances technically trained men are not employed in positions requiring this type of preparation. This may be due to many causes; political influence or other types of favoritism, ignorance of the qualifications required in the position by those in charge (possibly the right men are not in charge), by a desire on the part of those in charge to get engineering service at a minimum cost ("penny wise and pound foolish"), or, most unfortunately by plain greed.

In engineering construction and design, in the fields of public administration and of industrial management, which are essentially in nature, in the operation and maintenance of utilities there are many positions which are not, and yet should be, filled by engineers. This statement is very difficult to prove by statistics but it can be made convincing by illustrations that come from my own experience and reading and from that of my friends and colleagues.

Engineers are beset on all sides by competitors. On the one hand there are the skilled laboring groups which resent what they consider encroachments upon their territories; on the other hand there are the politicians, the bankers, the business men and the financiers who jealously guard theirs. Frequently these two groups unite with each other and with the uninformed taxpaying public to oppose the necessary job specifications (merit system or civil service if you will) and salary scales of publicly employed engineers that are

needed to secure competence and reasonable tenure. All too frequently the politician, the administrator or the financier has been the master and the engineer his paid assistant because the engineer has not taken his place in society to which his training and experience entitle him. In this respect he is often himself to blame because his entire interest has been centered on the mechanics of his job to the exclusion of all other phases.

This attitude toward social problems is natural when we consider the development of the science of engineering. The early engineers were mechanics, artisans, and it is only through a long period of growth and education that the professional engineer has emerged. This is well illustrated in an article on "The Development of Engineering in the Eighteenth Century" by Professor W. E. Howland.

"In England, where the government took no part in technical instruction and where the cult of the classically useless held sway in educational circles, no efforts were made to train the young engineers who were so urgently needed by growing industry. Most private industrialists were too busy making money to bother either with the welfare of their workmen or with the carrying on of research or with the training of their engineers. There were notable exceptions, of course, especially in the next century, as for example, Robert Owen, mill owner and philanthropist, who finally came to America and founded New Harmony, Indiana. The older institutions of learning, especially of Oxford (not Cambridge), committed body and soul to a study of the ancient classics, scarcely even recognized that such a thing as science existed in the world. British engineers were therefore self-trained or trained by the free private enterprise system of apprenticeship and pupillage—the most wasteful form of instruction which could be imagined—what has been called the worst enemy of technical education and the curse of "British Engineering." [1]

"Consequently the subsequent scientific research of England was done largely outside of University walls. It was undoubtedly impeded in its growth by the conservative attitude of the learned on the one hand and of the practical men on the other—conservatives who conserved and practical men who practiced the errors of their ancestors."

"Notwithstanding the fact that no provision was made for the training of engineers they appeared. The times were crying for them. The eighteenth century British engineers were humble men like the instrument maker, James Watt; not mathematicians nor professors in technical schools nor writers of text books as were the French. With few exceptions such as Christopher Wren, they were masons, wheelwrights and mechanics with little more than a common school education. They were, however, engineers in the original sense of the word; i.e., ingenious men. They were earnest and sincere in their devotion to their tasks and amazingly gifted by nature but unlettered and servile, poorly paid and treated as the lowliest of servants by their employers, yet they did not object to their degrading relations with their lords and masters.

"One of the first of these eighteenth century engineers was James Brinley,[2] 1716-1762, millwright and son of a cotter who built for his employer, the eccentric Duke of Bridgewater, the first successful canal in England and in so doing, not only pioneered many types of construction such as puddling with clay to insure water-tightness, but also showed the way to the vast international industrial development of the country. The original canal was built to develop the Duke's coal mine at Worsley near Manchester. But the venture proved so successful in reducing costs of transportation that a vast internal system of canals resulted for the handling of all kinds of goods such as the pottery produced by Josiah Wedgewood and the cotton and wool and finished cloth of the textile industries.

"Although Brindley was an absolute pioneer in British canal building and carried through to successful completion bridges, aqueducts and tunnels of unprecedented size and difficulty his pay was one guinea ($5.00) a week and a part of the pay due him at his death was withheld from his widow, while the Duke of Bridgewater became amazingly wealthy as a result of Brindley's work leaving a fortune of 600,000 pounds in money gifts alone to his heirs. After recording these financial details in the very fine print of a footnote,[3] Samuel Smiles, his nineteenth century biographer, hastily adds in large type that Bridgewater was a great public benefactor having subscribed liberally to a loyalty loan."

Engineers have seldom profited from their work in proportion to the benefits society has obtained therefrom. Whenever large profits have resulted from successful projects they have been reaped by others of the Bridgewater type. In many cases the engineer has scorned special remuneration as in the case of John Smeaton, another English engineers of the eighteenth century, who with Rennie and Telford continued the canal work begun by Brindley.

Probably the first man to call himself a civil engineer, John Smeaton began his education as a lawyer but, taking up instrument making as a hobby, he soon became interested in engineering. "One of his greatest achievements was the construction of Eddystone lighthouse, erected of masonry on a rock in the open sea. Two previous light houses had been destroyed; one by fire and the other by storm. But his was not destroyed, and for more than a century it stood as a monument to the imagination and ingenuity of this early engineer. It was finally replaced by a taller structure.

"One of the improvements in construction which made a success of this venture was an hydraulic cement which he developed by experiment. The greatest credit for the success of this light house was due to the care and patience of this designer and resident engineer, who saw to it that every single stone exactly fitted and dove-tailed into its neighbor so as to form in effect, a solid mass of rock which the waves could not overturn. This was done by means of a wooden model with every piece whittled by the skillful hands of its creator. (One might see here the early use of model techniques which plays such a large role in modern engineering.)

"Smeaton built many bridges. He is probably the first engineer to use a diving bell. He drained swamps and built breakwaters. He even made some improvements to the Newcomen engine and was greatly respected by Watt for his contributions in that field."

The biographer Smiles tells the following story of him:

"When the Princess Dashkoff urged him to go to Russia and enter the service of the Empress, she held out to him very tempting promises of reward. But he refused; no money would induce him to leave his home, his friends and his pursuits in England; and though not rich, he had enough and to spare. 'Sir,' exclaimed the Princess, unable to withhold her admiration. 'I honor you! You may have your equal in abilities perhaps, but in character you stand alone. The English minister, Sir Robert Walpole, was mistaken and my Sovereign has the misfortune to find one man who has *not* his price."

The early days of the railroads in the United States afford innumerable examples of the extremes of high engineering achievement and the prostitution of technological progress for personal gain.

Desmond Fitzgerald, an old and famous early civil engineer, stated in a lecture, "The railroads were built by dishonest men." He then explained that the engineers

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An Analysis of the Question of Unionism for Engineers

By HARRY E. HARRIS

Connecticut Society of Professional Engineers

There has been considerable discussion pro and con on the subject of Unionism for Professional Engineers and the protagonists of different backgrounds have advanced strong, convincing but opposing arguments upon the subject mostly obviously inspired by their own immediate personal interest in the matter.

Perhaps the views of a professional engineer who has had an intimate experience of forty years as technician, executive, engineer, educator and industrialist, and one who has no axe to grind, no grudge to pay off, in fact no strings whatever tied to him except perhaps, a love for, and a pride in his profession, and a sincere wish for the welfare of his fellow engineers, owing no man for any favors, belonging to no political party and free to call a spade without let or hinderance, might be found to be of some interest on the subject. Coming from an engineer with long standing and busy membership in national technical, professional, social, educational and military engineering associations and experienced in nearly every phase of engineering and several of its classifications and with an active acquaintance with Labor, Industry, Public Utility and Government Agencies in their engineering aspects, such a letter might be felt to have a broad impartial viewpoint stated in a cold, impersonal way.

Having thus briefly presented qualifications and without taking up a detailed discussion of all that has gone before but striking directly to the heart of the question, it is submitted that we should first break the problem down or divide it into separate questions for proper analysis. Obvious questions follow:—

1. What is the basic question? Unionism or Professionalism?
2. Is Unionism needed or desirable:—
   A) For the individual professional engineer?
   B) For the profession of engineering?
   C) For the social and industrial structure of the nation?
3. What are the causes of the inception of the Unionization idea?
4. What are the factors behind the above mentioned causes?
5. What will increase and enhance activities toward Unionization growth and what will have a retarding effect?

Now let us consider the above divided questions as impartially and as analytically as possible, starting with:—
NO. 1. What is the basic question? Unionism *OR* Professionalism? No, that is obviously not the question. There is not necessarily a question between the two. Professional men can unionize. It can be Unionism *AND* Professionalism. No, the real question is simply Unionism. A Unionism that takes in every Tom, Dick and Harry who have the remotest claim to technical ability in its broadest sense or who after years of muddling along on various technical jobs, without professional qualification would ascend financially by pulling down the more capable and successful engineers to their lower grade which they, without professional pride, would place on the level with technicians and trade workers.

The question of Unionism *OR* Professionalism is only for those of Professional attainments, not for those whose attainments fall short of such attainment. It may be safely assumed that those of proven professional qualifications will, in the main, never debase their professional standing, will never consider unionism for the profession unless forced into it by conditions that they cannot avert, engendered by labor groups on one side and by employer action on the other.

The Professional Engineer during the past decade has been emerging at a rapid rate from obscurity and growing in public recognition and esteem. It is hoped that his emergence will develop along the lines best for himself, his profession and the economic and social structure of his nation.
NO. 2. Is Unionism of Professional Engineers needed or desirable for the individual professional engineer?

For the successful engineer, it is but remotely possible that benefit could accrue from union membership but by it, he would be subjugated to the mass voice or authority of a union of technicians, or worse still, to a union boss. This would not be conductive to his further development, advancement or independence of thought.

There is a prevailing and increasing school of thought among the better able engineers that engineering is an accepted and responsible profession which should not be debased by banding in with technicians, draftsmen and other skilled workers in the trade groups and alliances, also that a capable engineer in an engineering capacity can obtain a commensurate salary in private employ. The inadequacies of public servant salaries for engineers does not enter the Union question. That necessitates a keener recognition on the part of the general public of the value of engineering services and by this is not meant merely the compensation value.
NO. 2 B. Is Unionism of Professional Engineers needed or desirable for the Profession of Engineering?

Consideration would indicate that it is neither. The profession, depending upon individual and collective effort for its advances in scientific development, research, invention and productive advances would undoubtedly suffer should it become subservient to Union rule and regulation. This implies no quarrel with unionism in its proper field and function. Unionization may be advisable for technicians, draftsmen, chemists and other operators of like ilk, whose duties are more or less routine and on the standardized levels, but that is not our question as members of the Engineering Profession.

The effects of unionization, should it ever become operative in the profession, would be felt as a retardent force in our universities and against the advancement of our young engineers who would indubitably be restricted in their expansion and development during their training period by union regulations and confined to a narrow scope of activity, as is now effected by existing trade unions in their particular spheres. The net result to the profession as a profession would logically seem to be certain to become reactionary and disastrous.

NO. 2 C. Is Unionism of professional engineers needed or desirable for the industrial and social structure of the nation?

Why should it be? Anything restrictive placed upon the constructive and mental talents within a nation needs must retard its development and react unfavorably upon the conditions of its people. It must be admitted from past experience that unionism has been restrictive as to apprenticeship, productivity, fields of activity and in admission to the right to obtain employment. The only restriction the Profession of Engineering should have is lack of learning, training and innate engineering ability. This restriction should be made more effective at the present time by more careful entrance requirements and weeding out in the Engineering Schools. Men lacking native engineering talent and aptitudes should never be qualified as Professional Engineers and a union card can never make a man a Professional Engineer.

National interest demands that the profession be maintained at its highest intellectual efficiency, union labels on it are no guarantee of that. There is a well-grounded feeling that the Professional Engineer should be a sound and neutral factor in discussions between employers and employees, or as we so frequently hear, between "Capital" and "Labor." The properly trained factual engineering mind is considered as well fitted for impartial and judicial arbitration or compromise and for this reason should it be withheld from the domination of Union Rule and partisanship for the best interests of humanity within the nation.

However, merely for the basis of consideration, let us suppose that the Engineering Profession did unite in a powerful union deminating all technical workers. Can you remember a few years back when a few idealistic (to use a mild term) individuals received world wide free advertising for their scheme of "Technocracy" and were known as "Technocrats?" What is the difference between that and the proposed Unionization? Most probably, if such a union were possible of accomplishment, it would be the most powerful factor in the world, it would "out-guild" the Guilds of medieval times, being an organization of the creative, planning and producing minds of the nation, its possibilities for political control and national dictatorship would seem unlimited. Its opportunities for widespread sabotage at long range through intentional errors in designs, plans, specifications, etc., with delayed discoveries would be unique and it would be difficult or impossible to trace the blame, particularly as such tracing would require engineering knowledge. Mental sit down strikes would be hard to controvert.

Any such concentration of power would be autocratic, not democratic. Would it be well or advisable? Perhaps? Each professional engineer must write his own answer.

NO. 3. What are the causes of the inception of the Unionization idea?

It is rather hard to select any other cause for the inception of unionization among any class except that it is an outgrowth of disgruntlement. The union demand is more pay and shorter hours and absolute power to enforce both. Apparently the support for this comes, among engineers, if graduates from those, who are disgruntled because they have not achieved high placement immediately as they may have been led to think was their due upon graduation, not realizing that all their school could give them was the fundamental educational tools of their profession and that years of training were still required for their professional development. From non-graduates, the support in the main sums to come from those, many of whom should not be classified as engineers, but who have had a somewhat narrow practical experience along some engineering lines and who while lacking many of the necessary qualifications, would like to acquire the status, professional and compensative, of a fully qualified professional engineer without further educational or training effort by themselves, hoping to substitute the union big stick for actual ability to serve.

Really well qualified or successful professional engineers have not been particularly evident in the desire for unionization and the conclusion would be that the demand for unionization does not originate with them.

NO. 4. What are the factors behind the above mentioned causes?

Perhaps leading the various other factors exhilarating the growth of the Unionization idea is the reluctance shown by some large industries, some powerful public utilities and some governmental branches and agencies to grant full and proper recognition to Engineering as a profession, and on the other hand the preference employment by them of substandard men as technicians in engineering work who are not licensed or registered or otherwise properly qualified engineers, thus building up a pseudo engineer element that turns readily toward unionism as a means of financial betterment, and at the same time degrading the quality of their employers engineering work. This is a growing and dangerous element within industry, calling themselves engineers, posing as engineers and demanding equality with the genuine engineer through unionism. The cure for this is evident. Industry, Utilities and Government should recognize the Professional Status of the Engineer and accord to those qualified as Professional Engineers that which is their just due, aid in the expansion and unification of the State Registration laws for engineers and have distinctive lines drawn between their engineers and those others who are merely technicians, sepcialists, draftsmen and highly skilled artisans. Failure upon their part in this matter may force engineers into unionization against their own desires. The organized opposition, however futile, by controlled engineering associations to State Registration and to the recognition of professional status of the engineer is a boomerang that is souring many qualified men, particularly in the electrical field, and some industries may find that their shortsighted policies are developing a more or less undesirable situation within their systems which will rise to plague them later.

NO. 5. What will increase and enhance activities toward Unionization growth and what will have a retarding effect?

For the first part of this question, increased dissatisfaction by qualified engineers on industry's payroll because of non-recognition of their professional status. Filling engineering departments with specialists, technicians, skilled experts, draftsmen, etc., and calling them engineers.

Trading in other ways on the professional pride of their bona-fide engineer employees. Failure to recognize the facts of the emergence of the engineer to a high professional status, a development inevitable in view of the rapid advance of engineering science during the past 60 years. All these will cause antagonism and loss of loyalty which is a condition rendering listening to union propaganda easy.

To the second part of the question, "what will have a retarding effect?" Recognition of the engineer as a member of a learned profession. National Engineering Associations, Universities, Industry, Utilities and Government should all assist him in maintaining his profession intact and unified as a profession by fostering, instead of opposing and attempting to emasculate, standard registration laws for professional engineers in all States and by differentiating between engineers and non-engineers in their employ. Thus, the Engineering Profession may be established in a position secure against union propaganda infilteration. The Profession will not unionize unless forced

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Engineer's Responsibility Toward the Engineering Profession

Address by Engineer Elmer C. Lawton, Assistant Commissioner of Highways, before the Albany County Chapter, N. Y. State Society of Professional Engineers

For the purpose of avoiding repetition and for the reason that Engineer Wheeler has introduced this subject in such an able manner, I will proceed at once to try and discuss the Engineer's responsibility toward the engineering profession from the standpoint of those in public employment.

In reaching a proper background, may I point out that society in general has only benefitted and progressed as a result of more or less concerted effort made possible by some kind of organization.

Let us go back to the time of the cave man where only that individual survived who was best qualified to meet all possible contingencies. It was a time of the survival of the fittest—physically, mentally, and individually. Looking backward, that era could not have been a very enjoyable one in which to have spent our life's span. The struggle for mere existence must have been a constant and violent one. The life span of all inhabitants was much, much less than at the present time.

As time progressed and as intelligence or intuition increased, the individual gradually realized that his general state or existence could be much improved and he could be assured greater protection, if need be, by banding together with a limited number of his fellow men for the primary purpose of common defense and, of course, the benefits of social contacts naturally followed. As the scope of his activities increased and his desires multiplied, these organized grouped were expanded and, in due time, reached a point that might be described as an organized society. This probably never could have been brought about without organization and cooperation. To the extent that all people had one common objective, much progress was made but, quite naturally, as successive objectives were met and overcome, others took their place, actuated by different desires or motives, no doubt resulting in an organization which had more specific objectives than the previous general one. I do not believe it is necessary to cite too many examples of the benefits of organization but probably the most outstanding one was that of self-defense against individual or organized aggressors and perhaps, at times, whole nations were involved. Following such major upheavals as regional or national defense, opportunities must have come to our forefathers to improve their status from a group standpoint.

Coming down to modern times, the existence of various organizations with specific or limited objectives is now a matter of common knowledge. For example, we have Chambers of Commerce, Kiwanis and Rotary Clubs, having largely to do with improvement in business and industry, increasing trade, etc. There are groups or organizations in the field of promotion, expanding knowledge and expediting the process of getting goods from the manufacturer into the hands of the consumer. The number of organizations in the field of education is a matter of common knowledge. In the field of civic activities, we have city clubs, forums, etc. In the political field we have the development of the political party or parties each of which is presumed to have objectives of general benefit. In the religious and social field, we have organized church groups and societies for mutual entertainment and for the purpose of attempting to uplift the morals and thinking of the whole nation. One could go on almost uninterruptedly with other examples of the existence and, in a sense, the need of organization. Last, but by no means least, we find organized groups in the professional field—many of them out-dating our present Society of Professional Engineers, and, from the benefits of such organization all around you, they would seem to be a matter of common knowledge.

In this complex growth of civilization and society, the individual has exerted his influence and must continue to do so—first to retain present benefits, expand them where possible, and to insure progress toward future ones. From the standpoint of these societies, the individual must have responsibilities in order to enjoy these benefits. Among the most important, of course, we could cite that of civic responsibility. No definition is really necessary for this phrase. We now are accustomed to take our civic benefits for granted, although many of us lose sight of the manner in which they were obtained. In an atmosphere of lassitude, the benefits might progressively decrease or vanish altogether unless they are preserved by some kind of organized effort.

I think it must be a matter of common knowledge that benefits to the engineering profession and to the public at large cannot only best be secured but, in my opinion, can only be secured by concerted or group action. By this I do not mean purely financial reward. Surely, as you look about the world and as age creeps up on you, you must be impressed that the rewards of our present civilization are much more than purely monetary ones. Such things as an increased respect for and an increased recognition of the benefits of engineering knowledge and practice can best be imparted by concerted action. In the last analysis and using modern language, the problem is a campaign of salesmanship—not of material things but of ideas.

Let us go back to the time of the first licensing law and speculate how it possibly could have been obtained without some kind of group or concerted action. An individual or two could have shouted to high Heaven for the need of such a law and his efforts would have gone for exactly zero. Will you go with me in fancy into any gathering and listen to conversation and comment with respect to law, medicine, dentistry, clergy, and then strain your ears to listen to comment about engineering unless you are in an engineering group. Professions can only increase respect and appreciation of them by acquainting the people with their qualities and accomplishments. This problem is not an individual one but a group one. Ways and means have been set up in this State and in many places throughout the nation for accomplishing such recognition and increasing the respect for the Engineering Profession by means of a state or national Society of Professional Engineers. It would certainly seem to me that next to one's civic and religious responsibility, we should then reach the point of professional responsibility.

In public employment, the situation is perhaps more complicated or possibly more confusing to the individual engineer, who is so prone to evaluate his benefits largely

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The Relationship of Engineering to Municipal Government

An Address By Mayor Harry W. Baals
Before the Indiana Society of Professional Engineers
Indianapolis, Indiana

Your program committee has assigned to me the subject, "The Relationship of Engineering to Municipal Government." It is a subject which interests me a very great deal, because there is nothing more vital to the success of municipal government anywhere than good engineering.

I am thinking not only of the narrower thing comprised by engineering technique, but the much broader thing comprised by what is known as the engineering approach. I think it was Kin Hubbard, of "Abe Martin" fame, who once declared that "no one can break up an argument quite as fast as a fellow who has the facts." I think that it is true, and I think it is especially true that only by the engineering approach to any municipal problem can it be solved. The engineer knows that no problem can be solved until the one attempting to solve it knows exactly the nature of the problem. The engineer by a thorough analysis of facts involved in any situation proceeds to his solution. Successful municipal government needs the same, orderly engineering approach in all its phases. To correct its problems, there must be an analysis of the facts involved.

A city, in meeting the demands of the present, or anticipating the probable demands of the future, needs a good engineering staff, for without adequate engineering, a city can no more develop properly than a mariner can navigate without a compass. I know from a wealth of actual experience, that no money is better expended by any city than the money it expends for good engineering. Good engineering saves vast sums of money, and poor engineering can likewise cost huge sums. The City Engineer's office has to be a laboratory in which many sound ideas can be developed and in which unsound ideas can be proved to be what they are.

Special attention which the present City Administration of Fort Wayne has paid to adequate engineering has more than justified itself. There was vast room for improvement in the engineering department in the matter of compiling accurate records. We had built, but we did not know exactly what we had built, or where we had built it. An elaborate survey was made of our sewage system, our water system, our electrical conduits and other concealed services so that today we have a very complete and accurate picture of everything pertaining to the physical property of Fort Wayne, concealed and visible.

Our respect for engineering technique and the engineering approach to the problem of municipal government has resulted in a number of new engineering applications. One of these applications was the employment in Fort Wayne of a traffic engineer, who would give the sort of same engineering attention to our street traffic problems that is given to other municipal problems.

Fort Wayne has a great respect for the business of getting facts first before attempting to solve any municipal problem. Shortly after our Administration took office, we established a cost research department so that we might analyze the cost of all our city departments and services.

We tabulate the expenditure of each unit by specific items and then have some basis for explaining our problem to the people of Fort Wayne through the media of newspapers and our own monthly publication, which we call *The Municipal Review.*

We operate on the theory that since City Government is the people's government, they have a right to be kept informed at all times of what it is doing. Methods are employed to show the taxpayer the cost of government services in terms of his own taxes. For example, we prepared a table showing that the owner of a $4,000 property in 1939, paid 42 cents a month for police protection: 48 cents a month for fire protection: 8 cents a month for garbage collection: 13 cents a month for street cleaning: 6 cents a month for street repairing: 32 cents a month for parks and recreation: 5 cents a month for public health activities: 15 cents a month for payment of city debt created in former years, and 27 cents a month for all other city activities. We showed that the owner of a $4,000 property paid $1.96 a month for all the services of his city government, or only $23.60 for the entire year.

Charts and breakdowns are used to provide taxpayers with a complete picture of the revenues and costs of the Civil City Government. If a taxpayer wishes more detailed information he may obtain it at our City Hall, because our analysis make such information readily available. We know, for instance, that it costs us 64 cents per mile per day to clean and maintain streets and a great number of other such specific facts. Making this data available helps to dispel false ideas about economy while at the same time encouraging an intelligent public interest in tax economics. Pointless criticism is prevented by supplying exact knowledge which paves the way directly for needed reforms and improvements. A municipal government which uses the engineering approach to its problems and takes the public into its confidence must necessarily produce achievements in service and economy or immediately incur the indignation of its voters. But if citizens have an intimate knowledge of what their city's problems actually are and what is being done to solve them, intelligent cooperation can be obtained from them.

Good municipal government is largely a matter of good engineering and accounting, plus, of course, the usual virtues that one expects in public officials. Give a city a good engineering staff and a good accounting staff, and it will have most of what it needs to be a success from the standpoint of government.

I would like to take advantage of this opportunity, to say that city-employed engineers are shamefully treated by most communities in the matter of adequate rewards. It takes long years of schooling and even longer years of actual experience to make a good engineer, yet many cities have good engineers who are greatly underpaid. When you consider that engineers can waste thousands of dollars for any good sized community every year by serious mistakes or save them like amounts each year by doing their work properly, it seems indefensible that municipal engineers should be so poorly rewarded. Probably the reason for public indifference to the compensation of public engineers

is the fact that engineering is an invisible thing which does not lend itself to the kind of drama which inspires better rewards.

I suppose the most common question asked by the average person in the United States today, is "What is going to happen to government in the United States all along the line in the years to come?" Perhaps I am overly optimistic, but I think the day is rapidly approaching when intelligent citizens everywhere are going to awaken and demand that public officials take the hokum out of government by putting the public's cards on the table where the public, which has to pay for the game, can plainly see them.

When you think of what public officials have done to taxpayers in the past, you are amazed that taxpayers can be so tolerant. In the first place, the old time office holder immediately decided upon election that the public's business was his own and that the less the public knew of its own business, the less the public would interfere in his administration of it. Bookkeeping in public offices was designed to show not a true condition of public finances, but an untrue condition. Accounting was used not to reveal facts, but to conceal them. The taxpayer was told, "There is a lot of mystery about government, and you wouldn't understand anything about it, even if we told you, so don't worry yourself too much about it. Just pay the bills, and let us do the rest." It was a splendid situation for all wasters in public office, but a very bad one for the intelligent citizen who not only wanted to know something about his government, but who felt a severe economic pinch on his pocket book every time taxes were raised.

There simply isn't any need for mystery or concealment about public affairs. Citizens who can operate their own garages, their own barber shops, their own shoe shining parlors, and their own professional or business offices, and can earn their own living, can understand the financial side of government if it is made understandable to them. And until the public generally demands that public finances be made clearly understandable for them, there won't be any point to the mere clamoring for economics. Economy in government is like economy in your home, your office or your shop, it is a matter of having a true picture of things as they are, and then a matter of using a sharp pencil, pushed by common sense.

There isn't any reason why a citizen should be made to buy police protection without any understanding of what police protection should cost, and likewise no reason why he should buy fire protection without any knowledge of what persons in other cities are paying for fire protection. These things can all be analyzed. These things can all be measured, and the business of buying government out of a grab bag, with all of its unavoidable waste, can be eliminated.

If the weakness of our American Government today all along the line seems to be that it has forgotten how to keep a set of books, and forgotten how to keep expenses matched with income, then it seems obvious to me that one of these days, there is going to be a rediscovery of the value of good accounting and engineering.

We like to talk a great deal in this country about saving the American form of government. It needs to be saved, but it can be saved much easier if we return to better public bookkeeping, for I would wager that more governments have died in a sea of red ink than have ever died in a sea of human blood.

Professional Engineer Examinations in New York State

A total of 221 candidates for Professional Engineers' License in New York State took the written examinations in January, 1940. Of this number, 111 (or 50%) passed, 72 (or 33%) were conditioned in one subject, and 38 (or 17%) failed.

The scores on the separate examination papers were as follows:

	Number Taking	*Passed*	*Failed*
Part I —Structural Planning and Design	163	142	21
Part II —Basic Engineering Sciences ...	141	67	74
Part III—Professional Engineering	153	92	61

The written examinations for Land Surveyor's License were taken by 14 candidates. Of this number, 7 passed, 5 were conditioned in one subject, and 2 failed.

Personal

David J. Camilli, director at large of the Pennsylvania Society of Professional Engineers, has joined the Allegheny Asphalt & Paint Co. Sixteen years ago Camilli joined the engineering staff of Allegheny County, advancing to assistant designing engineer. Twelve years later he organized the engineering office of the clerk of courts of Allegheny County.

New Officers of Ohio Society

The Ohio Society of Professional Engineers has elected the following officers to serve for the current year:

President: Harry E. Nold, Lord Hall, Columbus, Ohio
1st Vice-Pres: William C. Kammerer ,1900 Euclid Ave., Cleveland, Ohio
2nd Vice-Pres: Fred J. Cellarius, 36 E. First St., Dayton, Ohio
Secretary: William S. Dun, 63 South High St., Columbus, Ohio
Treasurer: Cecil R. Leavens, State Office Bldg., Columbus, Ohio
Past Pres: Carleton S. Finkbeiner, Nicholas Bldg., Toledo, Ohio

Rhode Island Elects Officers

New officers of the Rhode Island Society of Professional Engineers recently elected are as follows:

President: Joseph D. Guillemette, 53 Alburn St., Pawtucket, R. I.
Vice Pres:
Howard W. Congdon, 12 White St., Pawtucket, R. I.
George J. Geisser, City Hall, Providence, R. I.
Treasurer: Edward O. Greene, 144 Westminster St., Providence, R.I
Secretary: Daniel O. Cargill, Box 257, R. D. 2, Valley Falls, R. I.
Nat'l. Dir: Charles L. Pool, 40 W. Promenade, Edgewood, R. I.
Board of Directors:
Grant H. Potter, 199 Washington Ave., Providence, R. I.
Thomas H. Roalf, 27 Stanwood St., Providence, R. I.
Henry Ise, 15 Slocum St., Providence, R. I.
Leon L. Holland, P. O. Box 542, Wakefield, R. I.
Gilbert Small, City Hall, Providence, R. I.
Philip S. Mancini, 65 Chatman St., Providence, R. I.
Past Pres:
John V. Keily, State Office Bldg., Providence, R. I.
John E. Meade, City Hall, Providence, R. I.

Plan Conference This Fall

The Society for the Promotion of Engineering Education announces a conference on soil mechanics and its applications to be held at Purdue University, Lafayette, Indiana September 2 to 6, 1940.

The committee on organization for the conference is as follows:
Committee on Soil Mechanics, Civil Engineering Division, Society for the Promotion of Engineering Education.
P. C. Rutledge, Purdue University, Chairman
F. J. Converse, California Institute of Technology
R. F. Dawson, University of Texas
H. T. Jenkins, Cornell University
R. R. Skelton, University of New Hampshire
D. W. Taylor, Massachusetts Institute of Technology
J. D. Watson, Duke University
R. B. Wiley, Purdue University
H. F. Winn, Iowa State College
For Purdue University
A. A. Potter, Dean, Purdue University
For School of Civil Engineering
R. B. Wiley, Head, Purdue University
For Engineering Extension Department
W. A. Knapp, Assistant Dean, Purdue University
For Joint Highway Research Project
K. B. Woods, Assistant Director, Purdue University

Address all inquiries to:
Professor P. C. Rutledge
School of Civil Engineering
Purdue University
Lafayette, Indiana

The Professional Engineer

By ENGINEERS J. A. SHELBY AND R. S. GUINN

NOTE: This is the first of a series of engineering articles to be released by Travis Chapter—Texas Society of Professional Engineers.

Engineering is one of the oldest professions. Its fundamentals are mathematical facts which cannot be altered by legislation or by other acts of man. The Engineer, through his scientific research and with practical application, is still discovering broader uses for these facts which are assisting in the improvement of health and comfort of mankind. It has been authentically established that the general welfare depends on the introduction into business and public affairs of the trained intelligence, the careful analysis of objectives, methods, costs and relative values; the efficient and economic handling of enterprises; and the keen sense of public responsibility which are basically characteristic of the Engineer's approach to his problem.

The first Engineer was an individual who had a fondness for bending natural forces to his will and who was a genius for planning intricate operations. Engineering is a profession so old that it has never been traced to a definite beginning. Extraordinary monuments to the genius of engineering had been standing for centuries at the time of the earliest accurate historical records.

The early Engineer was necessarily an individualist. Obviously, in performing his work in many instances, he was forced to employ untried methods in an effort to achieve his objectives. Because of his lack of the present knowledge of physical sciences and engineering fundamentals, his knowledge of engineering necessarily was gained through trial methods, individual research, and by personal experience. Neither was he able to profit by the knowledge gained by his colleagues due to the lack of organization. With the growth of the profession and the freer means of communicating and exchanging knowledge, there naturally sprang up a desire for Engineers to form themselves into technical societies in order that they might have a systematized method of exchange of scientific knowledge, based on engineering research and practical experience, which the individuals had encountered in their engineering practice. The earliest engineering organization on record was founded in 1818 by a number of practicing Engineers in Great Britain. Ten years later this organization was incorporated by Royal Charter under the name of Institution of Civil Engineers.

Realizing the mutual advantages to both the Engineer and the public he serves afforded by establishing organizations for the purpose of disseminating professional knowledge, many societies have been formed since that time. The objectives of the majority of these societies have been the advancement of a particular branch of engineering. Most important among these branches are civil, mechanical, mining, hydraulic, electrical, sanitary and more recently, chemical, heating and ventilating, and aeronautical engineering. The growth of engineering and its present importance to our welfare as a nation and even as it affects each one individually, has prompted organized Engineers to increase the aspects of the objectives of the societies. It has been recognized that in addition to the societies for the dissemination of professional knowledge affecting the various specialized engineering branches, it was imperative that an organization be established which united all branches of the profession. This organization would be for the purpose of protecting the public and the profession against the practice of engineering by persons who were not properly qualified and in order that Engineers may take part in civil activities as a group. By the unified efforts of such an organization, both private and public enterprises requiring engineering consultation for proper analysis, would be safeguarded against possible economic and social loss.

A number of years ago an organization known as The National Society of Professional Engineers was organized with headquarters in Washington, D. C., its membership being limited to Professional Engineers trained and experienced in their particular branch of the profession. Engineers, licensed in the State in which they practice, are eligible for membership. The objectives of this Society are to represent the Professional Engineers of this country with a view of promoting the public interest as affected by the service of the Engineer, and to safeguard and strengthen the professional body for this purpose and to maintain integrity of professional practice.

The basis of this organization provides for State and local chapters. During April of 1936, Travis Chapter was organized by a small group of active engineers at Austin. The objective, during 1936, was to increase membership and to establish a State Society. In November 1936, the State Society was founded by united efforts of Travis and Bexar chapters.

Protective legislation was needed to aid the profession in achieving its major objective of promoting proper ethics in the engineering profession and thereby safeguarding the public against malpractice of those unqualified to render sound and economic council on engineering work. Travis Chapter thus took an active part in placing before the State Legislature a bill providing for the licensing of professional Engineers. This bill was in no way discriminatory and obviously would serve a needed cause in safeguarding life, health and property. The passage of this bill into a statute was effected by the Forty-fifth Legislature on May 30, 1937. Under the provisions of this Act the professional engineer is defined as a person who by reason of his knowledge of mathematics, the physical sciences and the principles of engineering, acquired by professional education and practical experience, is qualified to engage in engineering practice. The costs of the administration of the provisions of the statute are defrayed by fees paid by registered Engineers.

Recent years have seen Travis and Bexar Chapters grow in membership and in scope of activities. Two hundred sixty licensed Engineers are now active members in these Chapters. The organization of other chapters is being contemplated by groups of Engineers in several sections of the State. Committees are maintained by the State and Local Chapters to study State and local civic problems dealing in engineering matters. Travis chapter maintains membership and takes active interest in the Austin Safety Council and has lent active support to Red Cross and Community Chest drives, as well as taking interest in other public activities.

Realizing the interest of each citizen in desiring knowledge from the engineering standpoint regarding public undertakings, Travis Chapter contemplates the preparation of a series of articles dealing with the more potent public engineering problems. It is believed that through this medium each citizen will be cognizant of the economic advantages realized in dealing with each undertaking on a scientific basis, taking full advantage of the knowledge afforded by a thorough engineering analysis of each project.

Address by C. W. Post, Assistant Administrator-Chief Engineer WPA State of New York at Meeting of the New York State Society of Professional Engineers at Albany, N. Y. March 9, 1940

Note: The New York State Society on March 8 and 9 enjoyed its annual spring meeting and, among other things, approved its legislative program and directed the committee to proceed in its advocacy of legislation we believed beneficial to the profession. The luncheon meeting was addressed by Clarence W. Post, who has occupied the position of Chief Engineer of the W.P.A. in the State of New York for more than four years and who has surrounded himself by engineers of experience and ability. He has done much to improve the character of work undertaken by W.P.A. by advocating the planning of work—by requiring sponsoring agencies to submit sound engineering plans and specifications on all classes of work.

Last year, Mr. Post addressed a similar group of Professional Engineers at Troy. His address later appeared in "The American Engineer" and brought forth many favorable comments. The attached copy of his address refers to the number of engineers who have designed projects of some magnitude and should, in my judgment, be published in "The American Engineer," will be enlightening to all who read it.

A. E. ROCHE

If I were to ask individuals in this group: "What are the two great problems facing the people today?", each one would answer without hesitation Unemployment and Relief. Unemployment is no respecter of persons, professions, classes, races, or creeds. It has laid an equally heavy burden on the rich, the ne'er-do-well, and the poor. Proportionately, all have been affected. Unemployment is primarily caused by successive technological improvements perfected more rapidly than our ability to absorb them and depreciate our investment in current machines, structures, works and processes. Relief is a condition which deals with the person who has exhausted all his resources, and is on the public aid rolls. It is the latter section of the question which we will discuss.

In this State, the poor-house, the almshouse, the Charity Department, the poor-master are no more. All have changed their names. Now, it is the County Home, the Welfare Department, the Welfare Commissioner. The terms, you see, have been softened. This has been brought about by the State Welfare Act, which states that relief is a right, that any person may apply for it and, if found destitute, must be granted home relief. Under the law, the poor-house as we knew and abhorred it, can no longer be maintained.

During the early years of the depression, the cities, counties and states financed home relief and a limited work relief program. They were unable to continue their method of financing relief because the depression outlived our expectations, forecasts and hopes. The problem of restoration was beyond the financial ability of local and state governments. Some states bordered on bankruptcy and all united in an appeal for Federal aid. This appeal resulted in the C.W.A., where anyone out of work was given a job, whether he was destitute or not. That was a trial. Although it placed money in circulation when needed in 1933 and eased the tension which was developing, it was costly and soon was discarded. Out of it developed the Federal Emergency Relief Administration.

Both of these Administrations were controlled, for the most part, by social workers. The rules and regulations made it almost impossible to inaugurate a construction program. Both Administrations were the outgrowth of State T.E.R.A., controlled by social workers. Construction and work was secondary. Federal funds were not under the control of Federal officers but were allotted to the State as reimbursement for local expenditures on local work programs. This was an indirect method of business and consequently not satisfactory. Projects were, in most part for hand labor, and each community tried to find all the projects that would require little or no expense for materials and, as a result, we had the boondoggling type of work. The engineer has been excused for his lack of aggression in that period, because many believed the depression was short-lived and prosperity was around the corner. Hence there was a lack of vision in initiating work of a lasting and beneficial character.

W.P.A. is the outgrowth of other modes of local, county and state work relief. It has encompassed the best of the trial relief programs—it has discarded the weakness of its predecessors. The Federal government has withdrawn entirely from the home relief portion of the program and offers to pay the wages of all employable relief clients and to spend a small amount for materials.

A relief client has been defined as a person who has no honorable means of support for himself or those who are dependent upon him. There are in this state, 108 local relief officers who certify the eligibility of persons entitled to work relief. Therefore, the local communities furnish W.P.A. with the people to work on projects. The list of the workers is composed exclusively of persons who are unable to obtain work of any description in private employment. The list of workers contracts and expands seasonally. The able-bodied and most aggressive leave W.P.A. at the first opportunity.

W.P.A. came into being in the fall of 1935. Since that time, almost 250,000 people have been assigned to work projects. On February 3, 1940, the employment rolls showed 47,722 persons working. The difference between those assigned and those working is 203,000. That figure represents the number of W.P.A. assignees who have either returned to private employment or have been found ineligible for relief. A small percentage of that number, of course, has died or has left the program for various causes.

The peak of W.P.A. employment developed in December of 1935, within six months after its inauguration. That period may be said to be the low point of the depression.

An examination of the relief rolls for the six months period, July, '39 to January, '40, shows the following changes in the status of 45,743 workers who were interviewed in that period:

25,743	were discharged due to continuous employment for 18 months.
234	were discharged because they received unemployment insurance benefits.
93	were discharged as shirkers.
171	were discharged for unsatisfactory work.
203	were discharged for insubordination.
5,861	were discharged as habitual absentees.
520	were discharged for physical disability.
7,034	quit to enter private employment.
1,025	quit due to illness or injury.
785	quit for other Federal projects.
1,789	quiet on completion of work.
377	resigned.
595	quit because they had independent income.
1,237	quit for miscellaneous reasons.
78	quit for change in priority.

Therefore, in six months' time, over 45,000 employees were separated from the rolls. Congress decreed that no aliens could be continued in W.P.A. employment. As a result—5,553 persons were dropped. The Americanization of every worker must be certified to by the local Welfare Official.

The function of W.P.A. is to place men at work and to use advantageously the funds appropriated by Congress for work relief. The work to be performed, however, must be sponsored by a local unit of government such as a city, town, county or state. These units make application for funds to have work performed in order to reduce the cost of home relief, for which the Federal government makes no contribution, or to secure some needed public improvement with Federal aid. In no instance can the Federal government itself initiate the work.

An alert local government unit can receive immediate and lasting benefits by its own alertness in planning, designing and sponsoring sound engineering projects. In Rochester for example, we are boring sewer tunnels 40 feet below the surface of the main thoroughfares for a distance of 2½ miles. In Schenectady, we are constructing a trunk sewer 8 feet in diameter through the heart of the city at an estimated cost of $1,000,000. In Syracuse, we are completing one of the largest, most novel and useful sewage disposal plants in the country. In Buffalo, we have completed a permanent stadium to seat 40,000 people. In Elmira, we have reconstructed a bridge at a point where the Chemung River is 1,000 feet wide. In Utica, we have transformed the parks and swimming pools into realistic usefulness. In Fairport, we have constructed a building to house a library of 250,000 volumes. In Ithaca, we have constructed a large community house used exclusively for colored people. In White Plains, we have constructed a municipal bus terminal with masonry building and loading platform. In Fredonia, we have completed a dam and reservoir of exceptional design. In Amsterdam, we have completed a municipal golf pavilion with an eighteen hole course. This variety of work is typical of that which we are asked to do. What do you think was the influencing reason for each of these communities to sponsor such types of projects? If the work was not satisfactory and economic, those cities and other communities would not be sponsoring additional projects. In four years, over 8,700 projects have been sponsored and completed for 592 local units of government.

These larger projects are the result of sound engineering advice, furnished by the consulting engineer or architect of the sponsoring agency. The classes of work which we have been asked to perform during the past three years are at great variance with the classes of work we were asked to perform in the first year of W.P.A. The difference is marked by the entrance of the engineer into the W.P.A. program. The early part of our program was marked by the influence of the social worker.

We have been asked to perform hundreds of different classes of work. Many of these classes have been of an intricate character, such as dams, bridges, buildings, sewage disposals, schools, industrial railroad sidings, hospitals, highways, river and channel improvements, and reservoirs. The plans for these classes of work, aggregating over $35,000,000 came from architects and engineers. The sponsoring agencies have paid to consultants 169 commissions, aggregating over a million and a half dollars in fees. This work has been of tremendous benefit to the engineering profession. It likewise demonstrates the far-sightedness of sponsoring agencies in securing the advice of men who are trained and skilled in preparing plans and specifications for public improvements. In many municipalities where engineering forces are maintained, the services of such organizations have been utilized almost exclusively for the design of W.P.A. projects. In some of the larger municipalities, increases in the force have been necessitated to design and plan W.P.A. projects. Many engineers have been engaged by the sponsoring agencies to assume charge of the construction work as it progressed. We encourage sponsoring agencies to assign to each project, engineer inspectors to aid in progressing the work, thus assuring the sponsoring agency that the plans and specifications are being fulfilled.

In view of the fact that 83% of the W.P.A. workers are doing construction work, we require engineering plans and specifications for all classes except the simplest types of work. Not only must the work be well planned by municipal engineers or their consultants, but also those plans and specifications must be reviewed and cleared for thoroughness and practicability by independent and unrelated boards of engineers. For instance, all matters pertaining to sewage treatment or water supply are routed to the engineers of the State Health Department for conformity with recognized practice; all plans for school buildings and grounds are routed to the engineers and architects of the Department of Education in keeping with sound practice; all plans for river improvements, stream control are routed to the engineers of the War Department for clearance; all plans for dams, bridges, reservoirs are routed to the State Department of Public Works and to the Engineering Review Division, Washington, for approval. We are endeavoring, with the assistance of the State Department of Public Works, to require submission of plans for all rural highway improvements, thereby giving the State, which furnishes part of the money for rural highways, the opportunity to disapprove the utilization of funds on town roads which should be abandoned. The magnitude of the work warrants such a course. The engineer is capable of that responsibility. The public is entitled to that protection.

The Federal Work Agency is responsive to and in accord with the laws of the State. It likewise adheres to that statute pertaining to the licensing of engineers and architects for the preparation of plans and specifications, involving the safeguarding of life, health and property. It recognizes the beneficial and lasting results which flow from well-planned and executed public works, economically performed. It realizes that these works and processes can be more satisfactorily performed when they are carried through to completion under engineering supervision. The fact that 169 commissions, amounting to $1,500,000 were paid by sponsoring agencies—the fact that many municipal engineering staffs were augmented as a result of W.P.A. work—the fact that every key position in the Operations Division is filled by a licensed engineer, is conclusive evidence of our trend to sound projects.

Perhaps you are surprised that engineers have shaped the W.P.A. program during the past few years, but you must realize that the trend of engineering service is toward public enterprise. In a recent canvass of the American Society of Civil Engineers, it was found that 55% of its members are employed by agencies of the government.

Walter H. Wheeler, Consulting Engineer of Minneapolis, addressed the National Society of Professional Engineers last month and gave these statistics:

EMPLOYMENT OF ALL ENGINEERS

Year	*Private*	*Public*
1929	77.5%	22.5%
1932	71.2%	28.8%
1934	68.0%	32.0%

EMPLOYMENT OF CIVIL ENGINEERS

Year	*Private*	*Public*
1929	54.3%	45.8%

(Continued on page 26)

Proposed Recognition of Non-degree Technical Courses

From: C. E. Davies, Secretary Engineers' Council for Professional Development
29 West 39th Street, New York City

Participating bodies include the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, The American Society of Mechanical Engineers, American Institute of Electrical Engineers, The Society for the Promotion of Engineering Education, American Institute of Chemical Engineers, and the National Council of State Boards of Engineering Examiners.

Although technical institutes and other non-degree technical programs in colleges are universally regarded as representing a necessary part of education for industry, it was claimed at a recent meeting in Pittsburgh by representatives from fourteen schools and institutes that the graduates of these courses are denied any recognition by civil service commissions, the state licensing boards for engineers, or the Engineers' Council for Professional Development. In line with this thought, the representatives of eleven of the institutions represented at the meeting authorized Parke R. Kolbe, president of Drexel Institute of Technology, to present the following petition to E.C.P.D.

"For many years leading authorities of the world of engineering education have emphasized the importance of the non-degree or technical institute engineering program. They have encouraged the establishment of these schools as filling a definite need for men of a training shorter and less theoretical than that given in the degree-granting engineering college. At the same time, nothing has ever been done to recognize, accredit, or legitimize the certificate granted by this type of institution. As a result, the graduates of these schools have found themselves, in many cases, at a definite disadvantage, since the training which they have secured receives little or no recognition from the engineering profession, as well as from many industrial employers who are naturally in doubt as to the meaning of the non-degree certificate. The representatives of the institutions here assembled do therefore petition the Engineers' Council for Professional Development, through its Committee on Engineering Schools, or such other appropriate committee as it may appoint, to institute a study of the non-degree programs, both day and evening, now existing in this country, and to devise and propose such a plan of recognition or accrediting as may seem wise and just."

After consideration of the above petition at its April meeting, the Executive Committee of E.C.P.D. authorized Chairman J. P. H. Perry to request the Council's Committee on Engineering Schools, under the chairmanship of Dean A. A. Potter, to appoint a special sub-committee to make a most careful study of the petition and to present a report after such study at the annual meeting of E.C.P.D., to be held in Pittsburgh in October, 1940. The Executive Committee also advised President Kolbe of Drexel Institute of Technology as to its action and added the statement that it was much interested in the relationship of technical institutes to the engineering profession and in the apparent need for some further recognition in the form of accrediting or otherwise of such institutes.

Queens County Chapter, New York State Society

A very interesting meeting was held by the Queens County Chapter of the New York State Society of Professional Engineers in April, at its regular meeting place, the Lost Battalion Building, East Elmhurst, Long Island.

At this meeting, which was attended by about 125 members and their friends, Engineer Frederick H. Zurmuhlen, President of the New York State Society, was well received upon his official visit to the Chapter. In his address to the engineers, he stressed the importance of organization and urged everyone to spread the work being done by both the State and National Societies.

Another speaker was Engineer John C. Riedel, President of the National Society and Chief Engineer of the Board of Estimate. After discussing national affairs pertaining to the engineering profession, Mr. Riedel discussed the history of reclassifying the engineering service of the City of New York from its inception about four years ago to date. This matter is now before the New York State Civil Service Commission for its consideration.

A feature of the meeting was a non-technical, popular lecture, illustrated with slides in natural color on the subject of color photography. This was given by Dr. David D. Steinman, the First President of the National Society. After the lecture, Dr. Steinman answered questions in connection with his talk, and it is expected to have him give another talk in the near future on three-dimension photography.

Among the guests introduced were J. Franklin Perrine, Engineer of Sewers; Andrew K. Johnson, Engineer of Highways; Chester W. Cambell, Superintendent of Housing and Buildings of the Borough of Queens; and George H. Bruns, immediate Past President of the Chapter. Martin Nelson, President of the Chapter, presided during the meeting and introduced the guests.

P. E. Examinations in New York State

The N. Y. State Education Department has approved the recommendation of the State Board of Examiners for Professional Engineers that more time be given the candidates on future examinations, increasing the time allowed on each paper from three hours to four hours, without increasing the number or difficulty of the questions required to be answered. The new examination periods will be from 9 a. m. to 1 p. m. for the morning sessions and 2 to 6 p. m. for the afternoon sessions. To accommodate this change, the next examinations for Professional Engineer's license will be held on June 28th and 29th, instead of the dates previously announced.

Governor Lehman has signed the Conway bill which grants licenses without examinations to men who have been employed under certain conditions by the State or its political subdivisions since 1917. In acting on any applications that may be received under this amendment, the State Board of Examiners will proceed very carefully and with the advice of the Attorney General.

Metropolitan Section, American Society of Civil Engineers
Committee on Professional Relations

Fifth Progress Report—April 17, 1940

1. *Legislation at Albany*

The N. Y. State Legislature ended its 1940 session on March 31st, with a record of 5741 bills and amendments introduced during the session. With respect to bills of concern to the engineering profession, it seems that we may again report the score as "No hits—No runs—No errors." The six bills approved by the Metropolitan Section and other bills sponsored by the State Society all failed of passage. What is more important,—nine of the ten bills opposed by the Metropolitan Section were defeated in the Legislature. The tenth bill is the Conway Bill (Assembly Int. 1007, Print No. 1149) to provide mandatory licensing of sub-professional civil service employes without any educational qualifications or examinations. This Bill is now before the Governor for final action. The Metropolitan Section, through Col. Shea, has communicated to the Governor its disapproval of the measure. The State Education Department is also recording its objections, and there is little likelihood of the bill becoming law.

2. *New York City Legislation*

A proposed amendment to the city administrative code (Local Bill C 14), now awaiting consideration by the City Council, would prohibit the engagement of independent engineers or architects on any public buildings or other engineering projects in New York City, and would restrict all architectural and engineering services to Civil Service employees. This measure is vigorously opposed by the New York Chapter of the American Institute of Architects, which has invited the Metropolitan Section Am. So. C. E. to cooperate in protesting the passage of the bill. President Frederick G. Frost of the New York Chapter, A.I.A., has released an excellent statement of objections from the viewpoint of both professions. He says: "No professions have found the struggle more difficult in the last ten years than the architectural and the engineering. Private organizations have been constantly fighting for existence, paying taxes and rent and meeting payrolls, and no unnecessary obstacles should be created to hinder this effort. The employees in these organizations who so far have managed to keep out of government bureaus should not be forced into them now."

Policy on this general subject has already been repeatedly recorded by the Metropolitan Section in connection with similar proposed legislation at Albany during the past few years, and it is therefore consistent and appropriate for the Metropolitan Section to oppose the same attempt now embodied in a Local Bill.

Recommendation: That the officers of the Metropolitan Section be authorized to oppose Local Bill C 14 before the City Council.

Respectfully submitted,
COMMITTEE ON PROFESSIONAL RELATIONS
By D. B. STEINMAN, *Chairman*

Examinations for Appointment to Civil Engineer Corps, U. S. Navy

Examinations of candidates for appointment to the Civil Engineer Corps of the Navy have been authorized. The first will be a non-assembled examination for which candidates will submit their records in education and experience. Those found qualified for further examination may appear in Washington in June for physical and written professional examinations.

To be eligible for these examinations candidates must be between the ages of 22 and 30 on April 1, 1940. They must be graduates in engineering of an approved college or university and must have had two years and eight months of engineering practice, on April 1, 1940, at least two years of which have been subsequent to graduation.

The written examination will last approximately four days and will pertain to such engineering subjects as are embraced in the practice of the Civil Engineer Corps of the Navy. The five receiving the highest marks in the examinations will be offered commissions in the Corps with the rank of Lieutenant (junior grade).

The Civil Engineer Corps of the Navy designs and constructs all public works of the Navy, such as Navy Yards, air stations, hospitals, magazines and radio stations, and these activities include buildings, dry docks, ship building ways, piers, quay walls, railroads, roads, water supply, sewage disposal, power and heating plants, and distributing systems. The maintenance of these structures is also to a large extent the responsibility of the Corps.

Further details and copies of the Application form may be obtained by addressing the Chief of Bureau of Yards and Docks, Navy Department, Washington, D. C.

Soil Erosion and Flood Control

By W. C. LOWDERMILK

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We find dirty goat hair tents of the nomads pitched within or near the ruins of magnificent Roman cities of North Africa. The decadence of civilization from the flories of the past are evident throughout this broad expanse of territory. Many students have speculated on the cause of this decadence—whether it be due to adverse change of climate involving desiccation of the land, or to the wastage of soil resources by erosion, or to political changes wrought by invasions. Prof. Gautier of the University of Algiers who has been a student of the geographic problems of North Africa for 40 years, said to me, (Quote "We have no conclusive proof that there has been an important adverse climatic change since Roman times, but,—the people have changed." (Unquote).

We are looking upon a portion of the granary of Rome which was so important 2,000 years ago during the empire in supplying wheat and olive oil to Italy. Dry farming was carried out on the rolling plains and broad alluvial valleys of North Africa. Here we see one of those fields where the soils have been swept off practically to bed rock in the foreground; the hills in the distance are badly eroded from over-grazing. The mountains on the horizon are covered with remnants of Aleppo pine forests. Higher altitudes of the mountains were covered with forests of Atlantic cedar. In the middle foreground the land is still cultivated and is still eroding.

It was nearly 200 years after the destruction of Carthage by Scipio in 146 B. C., that Rome began to colonize North Africa extensively and to exploit agricultural possibilities in growing grain and olives. Military cities were established along the southern margin of the agricultural zone. Among these were Sbeitla, Tebessa, and Timgad. We are looking at the excavated ruins of the ancient city of Timgad, founded by Trajan about 100 A. D. Streets were laid out in symmetrical pattern. The city was equipped with magnificent public buildings, such as a forum embellished with statuary and carved porticoes, with a public library, with a theater for seating 3,500 with public baths adorned with beautiful mosaic floors, and with beautiful marble flush latrines. Timgad was an important city, supported by extensive grain fields in the valleys and olive culture on the slopes and hills roundabout.

After the Arab destruction of the city and slaughter and dispersal of the population in the 7th century A. D. the city was lost to knowledge for 1200 years. It was covered by dust, the products of wind erosion, until only five columns of a temple and a portion of Trajan's Arch remained above undulating mounds, as a tombstone to indicate that once a great city was here. More than 3 decades ago, the French Government began and is continuing the excavation of this famous Roman city. There is no counterpart today of the magnificence of this ancient city. Only a wretched village of a few hundred inhabitants exists as a descendant of this center of Roman power and culture.

The population of Timgad is estimated to have been about 25,000 Roman citizens with an unknown population of slaves.

The floors of the public baths were covered with beautiful mosaics, the more common of which have been put together and placed on the outside walls of the museum and the more beautiful and intricate ones preserved within the museum.

Within the city as well as at fairly regular intervals throughout the surrounding hill lands for 20 miles in each direction occur ruins of olive presses. This press had a diameter of 4 feet. The circular groove collected the oil as it came from the press and led it out by the straight groove into the container. The stone weight beyond was attached to the end of the wooden beam to keep the crushed olives under constant pressure.

Gsell, a great student of the ancient geography of North Africa, came to the conclusion that no important adverse climatic change had occurred since Roman times, although pronounced changes have occurred since the Ice Age of Europe. Dr. Godet, Director of the Museum at Timgad, decided on an experiment. If olive trees once grew in this region, and if the climate has not changed adversely, then olive trees should grow today. He planted an experimental grove on the top of an unexcavated portion of the city where there would be no possibility of sub-irrigation. He watered the trees during the first three dry summers and then did no more than to dig small basins about the trees. The trees are thriving and indicate the possibilities of restoring olive culture where the soils remain on slopes.

At Djemila, a near-by Roman city where not an olive tree is to be found in the region, excavators uncovered a huge olive press and piles of olive seeds which required 30 wagon loads to haul away.

Water erosion also, has been cutting up the land with gullies. An active gully has exposed a portion of the ancient aqueduct which supplied Timgad with water from a great spring at the base of the mountains three miles away. The spring now supplies the headquarters of the museum and the local French school.

As we read the long and fascinating story of land-use as inscribed in the landscape, sometimes we find a short story which tells the plot in brief. The lands within the farming zone of North Africa were originally covered with grasses and savannah woodlands and forests in the mountains. As this natural vegetation was cleared off, for cultivation or otherwise, soils were exposed to erosion. Rain wash swept soils from slopes, often to bed rock, and spread out erosional debris on lower slopes and valley floors, and beyond cut deep gullies into alluvial plains. The upper edge of the soil mantle is being shifted down slope as flashy run-off from the bared slopes cuts gullies into the alluvial deposits below. Further on, accelerated run-off has cut deep ravines into the alluvial valley floors in the same way as it does in our Southwest, and has brought on the effects of increased desiccation of the land, even if the rainfall has not changed. The land has been dried up by wild waters.

Bordering the agricultural lands was an outer zone devoted to the growing of olives on a large scale. We found ruins of large multiple olive presses. But at present there is not an olive tree within the circle of the horizon.

A detail of the ruins of this olive press discloses excellent workmanship and jointed masonry without mortar in the construction of these central olive presses.

Further beyond the zones of grains and of olives, was a broad zone of range land devoted to grazing during Roman times. Storm run-off was stored in elaborate stock watering cisterns. The French Government now is cleaning out these ancient cisterns for the same purpose. The largest Roman cistern has a capacity of 28,000 cubic feet. Moreover, the Government is building new and larger cisterns on the range. In this picture a modern cistern has a capacity of about 100,000 cubic feet. It was filled within a period of two years and furnishes water for grazing herds in this vicinity.

Near the desert margin of the short grass lands, we encountered at 75 miles south of Tebessa, 2,000 year old remains of remarkable works for conservation of storm run-off. A system of check dams such as this one, which was 110 feet long and 12 feet high, were built to divert water around the slope in canals. The French Government is cleaning these canals out to spread the water on the old system of terraces which date back to Roman or pre-Roman times. These remarkable works, similar to our water facilities works in the West, indicate that during Roman times, measures for conserving waters and soil had reached great refinement, due we believe, to the skill and traditions of the Phoenician colony of Carthage.

Why these terraces were built is still a mystery. Whether they were designed for the cultivation of African sorghum grains which are the most likely to be planted here, or for spreading water to increase forage growth, we do not know. At any rate, the French Government is now spreading water here to increase the forage for grazing herds of the Arab nomads.

We continued on to the Sahara Desert whose salmon colored sands form restless dunes, wandering hither and yon over a barren and thirsty landscape. In the distance is the oasis of Biskra, which is fed by a stream of sweet water issuing forth from limestone mountains.

The interior of the oasis is a refreshing contrast to the desert. The size of an oasis is told by the number of date palms growing in it and not on population. This oasis of Biskra is said to have some 250,000 date palms, which support a considerable community. Dates are the principal article of trade in the oasis and make up a good portion of the food supply for the local population. The native markets remind one of meetings of the Ku Klux Klan masquerading in sheets and pillow cases. Once, while traveling on the edge of the Sahara, we were able to get no food for 48 hours except dates. The first 40 or 50 were perfectly delicious, but after that our enthusiasm waned. Nevertheless, we ate some several pounds in a few days.

We leave the climatic profile across North Africa from the Mediterranean to the Sahara, where agriculture during Roman times was developed to remarkable refinements in the conservation of waters and soils varying with rainfall. We pass rapidly through Lybia where the camel and goats are characteristic features of the landscape. Camels are the ships of the desert. They stride along with elastic step and heads held high. The Arabs say that because the camel knows the 100th name for Allah and will not tell it to man, he assumes this haughty mien of disdain.

We pass over the Lybian Desert where rain scarcely ever falls and where the wind sorts the soil, leaving an erosion pavement on the lifeless landscape. We dreaded the Lybian Desert but found that Mussolini had just completed a 1500 miles autostrad in 10 months' time. There was a stretch of 400 miles without a turning.

After having traveled over some of the worst roads of the trip in the "no man's land" between Lybia and Egypt, we came upon the newly constructed paved highway between Alexandria and Cairo which led us by the pyramids of Egypt nearly 5,000 years old, whose giant forms incite us to reflect on the fate of civilizations through the ages.

At Memphis, an ancient capital until the 19th Dynasty, we have evidence of the gradual rise of the floor of the valley of the Nile, from depositions of silt in annual flood waters. The hazard of soil erosion has not troubled the tillers of soil here, where agriculture began about 6,000 years ago. Erosion hazard is a minimum on flat lands; but their area is far too small for crops now required the world over.

We tarried only five days in Egypt. After visiting two drainage projects, we passed over the land of Goshen where Joseph colonized his family and crossed the Suez Canal with its weird color of blue and followed the route of Moses and the Israelites into the desert of Sinai. Moses and his followers and their herds wandered in such lands as this for 40 years and must have overgrazed it, for today it is the picture of desolation.

Southern Edom is a hot and lifeless landscape reminding us of Death Valley, California. Solomon's ancient port at Aqaba was discovered by Dr. Nelson Glueck. Excavations under his direction have disclosed this ancient city to have been a Pittsburgh of the Red Sea, where copper was smelted 2,800 years ago. Fuel came from forests in the highlands and ore from the Araba. Solomon traded copper articles to other countries for spices and perfumes for his harem of a thousand wives. Poor fellow!

From Solomon's seaport on the Red Sea we visited the region inhabited by the ancient civilization of the Nabataeans who developed a remarkable agriculture and reached their golden age at the same time as the Chinese,—from 200 B. C. to 200 A. D. Petra, the unique capital city of the Nabataeans builded its religion and culture into monuments of living stone and hid them away in the fastness of a reddish desert gorge, was the Sela of the Bible. We are looking across the largest opening of the gorge in the Lybian red sandstone to the walls of the valley. Out of the living rock were carved the chambers and rooms of temples, tombs and public buildings and dwellings. Ruins of the dwellings of this ancient and great city, still lie unexcavated, where illiterate nomads grow patches of barley on favorite sites. Fascinating history is written here.

Rome extended her sway over the Nabataeans in the first century A. D. as is evidenced by this theater carved out of the native rock to seat some 3,500 persons.

From the land of Moab we crossed the Jordan as did Joshua; but found the river a disappointing muddy stream; then stopped at Jericho, whose ruins remind us of the story of how Joshua with his men brought about its downfall. We found charred grains of wheat or barley in the ruins which may have belonged to the household of an ancient occupant of the city of Jericho.

The traditional quarrel between Cain and Abel still exists in the region shown on the map and is made real by the repeated struggles between shepherds and farmers,—between tent dwellers and house dwellers throughout thousands of years in the Near East. The desert has produced more people than it could feed; from time to time its people have spilled over when defenses of the farmer in the alluvial plains were weak. The uncouth tent dwellers have, time after time, destroyed civilizations as they grew up in irrigated alluvial plains of the fertile crescent. The tent dwellers have come at different times from the south, from the east, and from the north. They have raided the stores of farmers and cities. They have destroyed their buildings and their works. Sometimes they have swept on leaving ruin and carnage in their paths as did the Mongols. At other times, they have replaced the former population and have themselves become farmers as did the Nabataeans, only to be overwhelmed at some later time by another wave of the hungry and fierce denizens of the desert. The agriculture to the south and to the east of the Mediterranean has for this reason developed under the spell not only of grasslands and desert beyond, but also of the fierce herdsmen. We are looking upon the tents of a nomad descendant of the Arabs who swept over the Near East and North Africa in the 7th century and at later times. They destroyed not only a civilization but its agriculture and what is more important, the traditions of its agriculture. They with their goats, unleashed the forces of erosion which have for nearly 13 hundred years been washing the soils from slopes into valleys.

The Promised Land which 3,000 years ago was flowing with milk and honey, is now a sorry commentary on man's stewardship of the earth. A scene near Hebron in the hills of Judaea on the road from Beersheba to Jerusalem, shows the soil washed off the slopes to bare rock, and lodged in the valleys. There the soil material has been sorted by storm waters each winter; the fine and fertile particles have been swept out to the sea to change the beautiful blue of the Mediterranean to a dirty brown to the horizon, as I saw last February. The coarser material is spread out on former alluvium where it is still available for cultivation. But more than this, the flashy run-off from heavy winter rains on the bared slopes, gullies the alluvium. The area of useful upland has been progressively reduced. Evidence of the overwash of rock from the slopes is found in mounds of stones cleared from the valley floor to increase the area for cultivation.

The hills of Judea have been largely depopulated; the soils are gone as the barrenness of slopes and abandoned village sites would indicate. In one area examined, out of 161 sites, 124 are abandoned. We are looking at the ruins of an ancient cistern which supplied the water for a village site not far from Jerusalem.

Where terraces have been maintained to hold the soil, crops of grain are still grown but yields are 3 to 7 fold instead of yields reported 2,000 years ago of 30 to 60 and an hundred fold. We are looking across the highlands of Judea near Jerusalem where the soils have been swept off the middle slope on the left and have been held back in part by the terraces on the right.

The erosional debris swept off the hills, together with the sand dunes, choked the stream channels in the coastal plains and caused marshes to spread over formerly densely populated plains. Malaria followed and drove out the population from the flat land areas.

Jewish colonization has purchased some 320,000 acres, which is 5 percent of the total area of Palestine, and has carried out some of the finest examples of the reclamation of old lands that I have seen in 3 continents. The Jews have transformed pestilential marsh lands into citrus orchards, and rocky hills into forests. This is one of the 250 colonies. An experiment station at Rehovoth is one of the best equipped that I visited throughout the survey. It is answering problems that arise on various types of land within colonies. I was impressed by the splendid devotion of the colonists to the land and to its redemption.

Nevertheless, insufficient attention has been given the problem of erosion control in the layout of citrus orchards. Trees are planted in straight rows regardless of topography, resulting in some erosion. However, we found an orchard which had been laid out on the contour and bench terraced. The land above the orchard and the irrigation ditch was furrowed on the contour and planted to forest trees. These two measures prevented the loss of run-off from this orchard during last winter's rains, which were the heaviest that had fallen in Palestine for many years. The man who put these measures into practice had been trained in the Institute of Water Economy at Tiflis, Russia.

The land of Bashan—east of the Jordan, was famous of old for its fertility and grain. It was also one of the granaries of Rome during the Empire. In much of this former wheat growing areas, soils have been washed off the slopes through neglect of rock wall terraces, ruins of which are noted in the foreground. The soils have been swept off the slopes, part of which were lodged in the valleys and are still available for growing wheat, but in reduced area. The glory of this famous region is fated.

After the conquest of Alexander the Great, his successors established in this portion of Syria a league of tencities called the Decapolis; Damascus, still inhabited, was the largest, and Jerash the second. We see in this view what the ruined city of Jerash overwhelmed by erosional debris, looked like before excavations were begun. Excavation in the foreground discloses the depth to which erosion has covered this famous city. According to archaeologists, Jerash was the center of some 250,000 people whereas the present representative town contains a population of only 3,000.

The main avenue of this great city was lined with columns famous throughout the Near East. The circular forum was one of the largest in the Roman world and one of the most beautiful. A view of the other side of the forum also shows a theater in the upper right-hand corner and a temple to Jupiter, in the upper center. Springs that furnished the water supply for this famous center are still flowing from the masonry protection built in Roman times nearly 2,000 years ago. The water supply has not failed; but the soil resource of the slopes has been seriously depleted.

From Trans-Jordan we hasten across the Syrian steppe to Mesopotamia. "Behold, how are the mighty fallen!" Mesopotamia, like the valley of the Nile, is a great alluvial plain forming the eastern end of the fertile crescent. In this land is the traditional "Garden of Eden." We surprised an Adam of today trying to bathe in a rain puddle without a leaf to hide behind. Out of this land come the stories of the "Flood" and Noah and his Ark and Daniel and the Lion's Den. Mighty Babylon is now a salty desolation. Mesopotamia is the graveyard of 11 empires which have risen and fallen in 7 thousand years. It has been the battleground of the mountain and desert peoples.

This Ziggurat, or tower temple and mound, built by human hands of mud brick near Baghdad, is reminiscent of the Tower of Babel. This great plain once supported a population estimated at more than 30 million people; but now is inhabited by less than 5 million in a state of decadence.

The land is still capable of supporting a much greater population—for the soil is there and the Tigris and Euphrates Rivers would supply irrigation waters, only requiring the initiative to divert them onto the land. A beginning has been made with the Kut diversian dam.

Cleaning silt from the elaborate canal systems of old was a task requiring great forces of well organized workers. Failure to keep the canals desilted in time of civil disorder or invasions, caused the lands to revert to desert and brought destruction and ruin to cities and agriculture and depopulated the plain.

This picture does not need color to show an incident in our travel of 600 miles across the Syrian Desert, repeatedly stuck in the mud for several days. One night the Iraq Oil Company sent out 3 trucks to rescue us from our mire. One truck got lost, one got stuck in the mud and one had a puncture. The lost one saw the lights of the one stuck in the mud and rescued it, the other one changed tires and found us and finally all had a happy reunion and we got to bed at 2:00 A. M.

Back again, across the Syrian steppe, we take a look at one of the most amazing and colossal monuments of the Near East rivaling the great Temple of Karnak in Egypt. It is called by some the grandest architectural achievement of ancient times. Baalbek, known to the ancients as Heliopolis, was a cross roads of classical times; it lies north of the Dead Sea. The Orontes River rises not far from Baalbek and flows northward emptying into the Mediterranean near Antioch. The valley of the Orontes in Roman times was populous and rich.

The magnificent temples to Jupiter and to Bacchus, converted into Basilica by the Christians, were destroyed by a succession of earthquake shocks, but never restored. The Great Court was 340 feet square, surrounded by 84 columns. The Shrine of the Temple of Jupiter, or the God of Heliopolis, was 290 by 60 feet and was surrounded by 58 columns of which only 6 are left standing: the columns are 7½ feet in diameter and 62 feet high. The foundation stones are 14x14x30 feet moved in an unaccountable way from a quarry about two miles distant.

Twenty red granite columns 4 feet in diameter and 30 feet long came from the granite quarry in Assuan Egypt, the archaeologists tell us. If that be so, they were floated on barges, 600 miles down the Nile, then across the Mediterranean to some point near Tripoli, then rolled by human hands up over the Lebanon Mountains through a 4700 foot pass down to Baalbek.

The doorway of the Temple to Bacchus is a masterpiece of masonry.

Fragments of beauty! Fragments of the glories of the past, destroyed by an earthquake; yes, but the country did not or could not rebuild; erosion stripped the land of its fertility; the physical resources and the human spirit which gave rise to these magnificent structures were gone. Decadence has spread throughout the land.

Years ago, before the days of automobiles, Mark Twain visited these ruins. He named his horse Baalbek, because he said, "It was such a magnificent ruin."

Northward on the Orontes River stands Hama, now one of the most purely Arab cities of Syria; here are the famous water wheels of Hama which have been groaning for the past two thousand years and more. Their noisy groans and squeaks can be heard for miles. They are called "Persian water wheels" and may have been introduced by the Greeks from Persia after the conquest of Alexander.

The largest wheel is 80 feet in diameter. The river current turns the wheel once in 65 seconds lifting water into an aqueduct to supply the town. The wheel is made of walnut wood; as pieces fail, they are replaced by a special craft of workers. No part is as old as the wheel; despite many replacements of all parts, the wheel is the same that groaned on its wooden bearings more than 2,000 years ago.

Upper Syria is still a wheat growing country. Harvest is a festival lasting all through the rainless summers. The method of breaking wheat straw into chaff for winnowing, is the same today as it was 20 centuries ago.

A young Syrian land-owner, I was told, once decided to take a personal interest in managing his estate. He was present at the threshing floor to divide the harvest of a tenant. The wheat was divided into two equal piles, one for the tenant and one for the landlord himself. He said, "What about the straw?" "The tenant gets all the straw," he was told. He said to the tenant; "Next year you are to plant only wheat, but plant no straw."

More than 5300 years ago, a Semitic people swept in from the desert and settled along the coast of what is now Lebanon. They located their towns on islands just off shore or on peninsulas. Two of these harbor towns became known as Tyre and Sidon; Beyrouth as shown in this picture, was another. These ingenious people became known as Phoenicians, the first vassals of Egypt and great sailors and traders.

Ancient Phoenicia was a mountainous land, rising out of the blue Mediterranean with little or no coastal plain. Only two small plains, one near Acre and the other near Tripoli, in the north, offered flat lands for the early development of agriculture. The population doubtless soon exceeded the carrying capacity of flat lands; and the people were forced to find alternatives.

The mountains of Lebanon rising to a crest 10,000 feet in altitude, were heavily forested; the greatest extent was covered with forests of the famous trees of Cypress and Cedars of Lebanon. This forest became the timber supply of the treeless alluvial plains of the Nile and Mesopotamia; it was the first farm forest. The Phoenicians turned to ship building and sea trade in their timber. An inscription on a column of the Temple of Karnak, dated 2840 B. C. announces the arrival in Egypt of 40 ships laden with timber of Cedar of Lebanon.

As the timber cutting was pushed up slopes, the cultivation line followed. I have come to the conclusion that it was here on these slopes that the tiller of the soil of our western cultivation and of soil erosion, between 4,000 and 5,000 years ago. Hitherto, agriculture was perhaps confined to irrigated flat alluvial lands as of the Nile and Mesopotamia and smaller areas. As the slopes of deforested Phoenicia were cleared, they eroded under the heavy winter rains, then as they would now.

We may believe that the Phoenician farmers, because of their resourcefulness were the first to apply measures of soil conservation in constructing rock wall terraces to reduce and flatten slopes into horizontal benches of land. The roots of our movement for soil conservation in the United States strike deep into the past.

The results of the battle with erosion for more than 40 centuries in the old land of Phoenicia have special interest for us. The fate of the land is plainly written in this aerial view; the forest was cleared; the land cultivated; soil erosion swept soils down slope; terrace walls were built and failed to be kept in repair.

The upper edge of the soil mantle is gradually shifting down slope. The irreversible and diabolical process of soil erosion has moved on in its cumulative and inexorable course. The piles of stone tell a graphic story, of the gradual loss of the finer fractions of soil leaving rocks behind at the surface. These, the farmers have collected into heaps to clear the ground for easier working. Erosion control here has been a losing fight.

When terrace walls have been maintained, the soils are still productive after possibly 4,000 years of continuous use.

An economy of survival will drive a people to go to greater lengths to save their soil than our commercial economy dreams of.

Not far from Beyrouth, is a valley where we found the climax in adjustment of permanent agriculture to steep sloping lands. It was the most significant find of the trip. It proves that when man will protect the soil on sloping lands, the good earth will continue to feed mankind for thousands of years. As one looks over the panorama of a mountain canyon, with its tier upon tier of terraces, representing in labor, a solid stone wall on either side of the canyon, some 1,000 some 2,000 or more feet in height, one marvels, and feels exhausted in contemplating at the vast amount of labor of generations of people over centuries of time, to provide themselves and their descendants with permanent agricultural lands on steep slopes. Often these terraces occupy every foot of available land, even to the very edge of the precipices and from almost sea level to an altitude of 5,000 feet. The terraces make the canyons appear as a vast stadium with huge stone benches running around the sides, tier on tier.

Slopes up to 76 percent are safeguarded from erosion at costs per acre that are fabulous in a commercial economy. With wages at 40 cents per hour for 8 hour days, the cost of the labor to level terrace such slopes works out at 2 to 4 thousand dollars per acre, for 50 to 75 percent slopes.

The famous historic forests of the cedars of Lebanon have retreated before the axe and hoe until only a few remnants of the forest are left. The most important is the grove of the Tripoli Cedars visible in the cup of this valley. In the foreground is a young planted cedar. The farm forest of ancient times has disappeared; it is a tragedy in land-use.

A view from the interior of the grove shows a young tree growing up from seed, silhouetted against the slopes grazed bare by goats. This young tree signifies a promise of the future against the barrenness of the past; it holds out promises of conservation in its wider sense, of human and natural resources.

A new conception of land classification is forced upon us. We begin to appreciate to what lengths people will go to conserve soils if necessity drives. A new conception of our responsibility to safeguard the physical integrity of the resource arises out of our study of such stupendous works in soil conservation.

Surely, we have here on of the wonders of the world, for the lessons learned by the ancient Phoenicians, are still followed after some 4,000 years. Here then is the dawn of a discovery in the experience of the human race that takes its place with the discoveries of fire, of the production of food crops, and of smelting metal ores, and of electricity and of chemistry.

As copper was known two thousand years before it was used for masonry tools, for building the Pyramids, so it has required 4,000 years for soil conservation to become the conscious and avowed policy of Governments. Never has this essential discovery for sustaining civilization been so fully understood and the services of science and technology so well marshalled as they are today in the United States. The experience of old countries, and the rapid exposure of slopes to cultivation in our country and limited farm land of the earth counsels us to carry on a well rounded program of conservation of land. We know erosion for what it is, and some ways to reduce it. Rather than deplore what we have lost we must save and improve what we have left.

SUMMARY

By this survey we have found much of benefit to the United States; we have studied classical reclamation of sand dunes, of pestilential marches, and of torrent control. We may profit by successes and failures of older nations and their expenditures totaling hundreds of millions of dollars in reclaiming waste lands and in saving their remaining lands. We are cautioned in a survey of the tragedies of fallen civilizations to avoid their mistakes in the uses of land.

Another lesson has been repeatedly forced upon us in this survey; that, is, when sloping lands are cultivated without measures to protect soils from erosion, they wash away, leaving sterile and rocky ground, undermining the very foundation of a people and of a civilization; but when protection of sloping lands is maintained, they may be cultivated for several thousand years as we have seen. This protection, however, becomes tremendously expensive as population pressure pushes the cultivation line up steep slopes.

Out of many findings one simple measure may be cited, if applied consistently on sloping lands of deep soils, that would be worth billions of dollars to our country and would assure permanent agriculture over vast areas. It is simply this: locate field boundaries on the contour and break up slopes of deep soils with permanent strips of some perennial and supplemental crop. Then the force of gravity would work for us each time the farmer plows, or soil washes, always building the land into permanent benches. The suiting of this measure to our agriculture is an urgent problem in our nation-wide movement for conservation of soil and water.

It is on sloping lands that the tiller of the soil has been confronted throughout the ages with his greatest single problem of maintaining a permanent agriculture.

Aside from technical findings, one of the major implications of our survey is, that land in the final analysis is not an economic commodity; it is an integral part of the corporate existence of a nation as its people are. The conservation of the physical resource, the heritage of a people for the present and future, becomes a high duty of the individual and of the nation. Where economics of individual interest fail, social economics must take up the burden, with cooperation, assistance and regulations. Our responsibilities to Mother Earth are akin to those to our Creator and to our fellow men. We may express this obligation as an Eleventh Commandment which Moses doubtless would have been inspired to deliver to the Israelites had he foreseen how the Promised Land and billions of acres around the world, would be damaged by the ignorance, negligence and suicidal exploitation of lands of succeeding generations. It should have read as follows:

XI. Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect thy hills from overgrazing by thy herds, so that thy descendants may have abundance forever. If any shall fail in this stewardship of the land his fruitful fields shall become sterile stony ground and wasting gullies, and his descendants shall decrease and live in poverty or perish from off the face of the earth.

The injunction is 3,000 years late; its need of application in a modern spirit is all the more urgent.

The continued progress of civilization is won or lost in the war with erosion on sloping lands.

Officers Elected—Essay Contest

At the recent annual meeting of Bronx County Chapter of the New York State Society of Professional Engineers, held at the Concourse Plaza Hotel, Engr. William Arctander was reelected president. Other officers reelected were: Paul T. Trupler, vice-president; Solon Friedeberg, treasurer; and Victor De Maria, secretary. Directors who were elected for a term of three years are: John J. Kelly, Bro. Amandus Leo, Henry Vermont, and Richard C. Mugler. Engr. Arctander reported on the winter meeting of the State Society held in Albany on March 8th and 9th, at which Engrs. Arthur V. Sheridan, William Arctander, Raymond C. Sullivan, Bro. Amandus Leo, Bro. Aubert, Ernest Fox, Leo Hickey, and Joseph B. Diamond represented Bronx County Chapter.

Bro. Amandus Leo reported on the legislative program of the State Society for the current session of the Legislature and urged support of bills introduced in the name of the society.

Engr. Fox in his fourteenth annual report, reported on the progress of the State Society, its increase in chapters and membership, and its better financial standing.

A report of the committee on under-graduate relations was given by Bro. Aubert. The purpose of the committee is to foster a closer relationship between the engineering students and the professional engineers. It was proposed that the Chapter invite the engineering students of the several colleges in the Bronx to some of its meetings in order to acquaint them with the work of the Society.

BRONX COUNTY CHAPTER
N. Y. STATE SOCIETY OF PROFESSIONAL ENGINEERS

ESSAY CONTEST
for Bronx High School Students

on the Subject
WHAT QUALIFICATIONS DO YOU CONSIDER MOST IMPORTANT FOR AN ENGINEER

ELIGIBILITY:
Students residing in the Bronx and attending any high school are eligible. Students attending any high school in the Bronx are eligible.

SUBJECT MATTER:
The engineer conceives important projects, investigates their feasibility, designs them, and supervises their construction, operation, and maintenance. His work requires a knowledge of economics, planning, finance, organization, and management.
What qualifications do you consider most important for a person engaged in such work?

FORM:
Essays shall not be more than 1,000 words in length. They shall be handwritten legibly or typewritten on one side of white paper 8-½ x 11 inches in size. The contestant's school and contestant's name and address should appear on the first page and nowhere else. The essay should begin on the second page.

PRIZES:
First, second, and third prizes of $25.00, $15.00, and $10.00 respectively. A certificate shall be issued to each of the contestants submitting one of the best 10 essays. The decision of the judges shall be final.

All assays must be submitted to:

JOSEPH B. DIAMOND, Chairman of Essay Contest Committee
152 West 42nd St., New York, N. Y.

Report of the Legislative Committee

National Society of Professional Engineers for the Year 1939

"TIME MARCHES ON"

By Samuel I. Sacks, Chairman

Although many legislatures met during the past year, the progress made was not encouraging. In one state registration received a serious setback. Two more states have joined the ranks; those of Maryland and Vermont, making it 42 states and 3 possessions having registration acts. Seven more to go. TIME MARCHES ON.

If you look at a map of the United States with those states shaded which have registration, you will now see but a few states not shaded.

Within the same time several of our larger or important states, which have only partial registration, should act to make the result unanimous. Idaho has already done so.

Since most legislatures will meet in 1941 and a few in 1940 it would be well for all our State Societies to now plan their campaigns to have registration laws passed or strengthen those they now have.

The progress made by states since the last report follows:—

Maryland joined the procession on May 27, 1939 when it passed its registration act, effective June 1, 1939. It contains a number of conditions peculiar to Maryland. For a copy of the act see the October-November 1939 issue of the "AMERICAN ENGINEER"—page 19. It became the forty-first state. TIME MARCHES ON.

Vermont became the forty-second state during the summer of 1939. This act will shortly be printed in the "AMERICAN ENGINEER."

Idaho, which formerly licensed Civil Engineers, passed a new act which closely follows the "Model Law," except that Mining Engineers are excluded. The August-September 1939 issue of the "AMERICAN ENGINEER," page 14, contains a copy of this act.

California. The Civil Engineers' Registration Act and the Licensed Land Surveyors' Act were made part of a Business and Profession Code. Careful study was given these acts and as codified were passed and are now effective.

Rhode Island. The act was amended (H939) to extend the Grandfather Clause until April 23, 1940.

Arkansas. Act No. 335 passed during the past session of the Legislature provides that all engineering plans, specifications and reports submitted to the State or any sub-division thereof must be signed by a registered professional engineer. Further, all construction work done in accordance with such plans must be supervised by a registered professional engineer.

Missouri. The Architects' and Engineers' Joint Licensing Act was defeated in the past Legislature. However, our state society is not to be daunted; they have already formulated plans for a successful campaign at the next session of their Legislature.

Delaware. The Engineers' Registration Act was reported out favorably by the Senate Committee on March 31. However, it failed of passage by one vote. Our constituent society is certain of its passage in 1941. This seems strange since Delaware has an Architectural Licensing Law. Complaint has been made to the State Department of Delaware because it has been issuing licenses for "Engineer" although it has no registration act.

District of Columbia. Senate Bill 1128 providing for Engineering Registration in the District of Columbia was introduced by Senator King. The bill was a compromise. It received the approval of the Committee on District of Columbia and passed the Senate. Due to the press of nationally important legislation Congress adjourned before the House acted on this bill. It is hoped the present session of Congress will finally enact such legislation. Here, too, is an enigma. The District of Columbia also has a licensing act for architects.

The O'Toole Bill HR4798 providing that only lawyers may practice before the various governmental administrative boards has had a number of hearings. Thanks to the strenuous efforts of our Washington office and Chapter, Representative O'Toole has given assurance that professional engineers will be exempt from the effects of this act.

Pennsylvania. Success has crowned the efforts of the Pittsburgh Chapter in the Trigg case mentioned in a previous report. The decision is fully reported in the June 1939 edition of the "AMERICAN ENGINEER," page 6. The effect of this decision is that none but registered professional engineers can hold positions which require responsible engineering knowledge or which have the title "engineer."

The architects and engineers of Pennsylvania have joined forces and have agreed to jointly sponsor legislation. This bodes well. As a result the 1939 Legislature passed the amended Architects' Registration Act greatly strengthening the existing act. An act which provided for only registered engineers or architects signing plans, specifications or reports submitted to the various subdivisions of this commonwealth passed both houses, but was vetoed by the Governor. A third act relating to fictitious names and corporate names did not succeed in passing one house.

Indiana. An attempt to establish a "Merit System for Professional Engineers in Public Employ" failed. However, our representatives were successful in killing an effort to compel the Engineering Registration Board to grant licenses to duly elected County Surveyors.

New York. The able and active legislative committee of our N. Y. S. P. E. was successful in defeating every act it opposed. The registration act was again strengthened so that today it is probably the most stringent in the United States.

A ruling by the Attorney General was obtained requiring that all Reconditioning inspectors in the H. O. L. C. had to be registered professional engineers. Efforts to establish a Supervising Professional Engineers' Union failed because of the activities of the above committee.

Even Jack Dempsey aided us with a knockout blow. In a case against him it was decided that an unlicensed architect could not recover a fee for services rendered.

(See May 1939 edition of the "AMERICAN ENGINEER," page 4.)

West Virginia. At the request of The State Registration Board the Attorney General has made several important rulings which aid the cause of engineering registration. Following the lead of other states it was ruled that a corporation could not practice engineering. He also ruled since there is no classification of engineers under the Act a registered engineer can practice any branch of the profession.

New Jersey. This state is the only one to receive a setback. As a result of a dispute between the Secretary of the State Board of Professional Engineers and the State Board members, political force was sufficient to have a legislative act passed to make the present Secretary of the Board almost an absolute dictator. He has formed another state society with a confusingly similar name and granted perpetual membership with no dues in order to maintain political control. It is anticipated that the next year will see these conditions rectified and the act revised to what it should be.

Texas. Cooperating with the other engineering societies and the A. I. A. efforts to change the engineering registration act were defeated. The passage of a Building Code which was undesirable was stopped by the same forces. Co-operation always pays.

Arrangements were made with the publisher of City Directories not to accept the advertising of any engineers unless they were registered.

Oklahoma. The District Court enjoined one Gerry M. Orr from holding himself out as an engineer and contracting with the town of Glencoe, Oklahoma, when he was not registered.

Ohio. A bill requiring plans and specifications submitted to the various administrative agencies contain the signature of a registered professional engineer or architect was reported favorably by the appropriate committee; but because of conflicting legisaltion, adjournment was had before it came up for vote.

An attempt to reopen the Grandfather Clause of the Registration Act was successfully slaughtered in committee. The American institute of Electrical Engineers which has always opposed registration has submitted a new model act which in effect would except all employed electrical engineers. This, of course, would destroy much of the good work already done. The weakness of this act was pointed out by our past president, Arthur V. Sheridan, in the August-September issue of the "AMERICAN ENGINEER," page 13.

Fourteen states have Contractors licensing acts. Texas and Ohio are now considering such acts. A list of the states having such acts is printed in the "AMERICAN ENGINEER" for February 1939, page 3.

Replies received from the members of our Legislative Committee indicate a marked increase in the enforcement of our Registration laws and successful prosecution of violations. This is a good sign as it proves that engineers are awake to their responsibilities.

A recent article entitled "Professional and Occupational Restrictions" appeared in the April 1939 issue of the Temple University Law Quarterly (Philadelphia). It contained a great deal of information with regard to engineering registration. Many dates given seemed to be erroneous and it also appeared that the writer was confused between professional engineers and stationary engineers. This author, after some correspondence, advised your chairman that he had obtained this information from a table in the "Professional Engineer" for December 1935 (A. A. E.). He further advised that the article is to be included in a volume on American State Administration.

Correspondence with regard to legislation and enforcement was had with engineers of Venezuela, Porta Rico, Canada, Ireland and France.

Of course I take this opportunity to thank all those who have aided in this report.

This time, my time hath ended.

Respectfully submitted,

SAMUEL I. SACKS,
Chairman.

Sesquicentennial Celebration

One Hundred and Fifty Years of Patent Office Commemorated by Nation

President Riedel Participates as Member of Distinguished Committee

The One Hundred and Fiftieth anniversary of the Federal Patent Office was celebrated in April with appropriate ceremonies held in the nation's capital. An exhibit, in the Department of Commerce Auditorium, designated as the "Parade of Inventions," was followed by a dinner in the Hotel Mayflower and the occasion concluded by a pageant and radio program.

In order that the history and importance of the Patent Office might be effectively brought to the attention of the nation as a whole, the 76th Congress passed a resolution authorizing the appointment of a Sesquicentennial Commission to commemorate the signing of the original Patent Act which took place in 1797. This Commission, which consisted of the Hon. Harry L. Hopkins, Secretary of Commerce, Hon. Charles Edison, Secretary of The Navy, Dr. Charles F. Kettering, President, General Motors Research Corporation; Hon. Homer T. Bone, Chairman, Senate Committee on Patents;; Hon. Charles Kramer, Chairman, House Committee on Patents; Hon. Conway P. Coe, Commissioner of Patents; Hon. Finis J. Garrett, Presiding Judge, United States Court of Customs and Patent Appeals; Hon. Wallace H. White, Jr., U. S. Senate; and Hon. Fred A. Hartley, Jr., U. S. House of Representatives, nominated a national committee of distinguished scientists, inventors, engineers and industrialists, with the Hon. Harry L. Hopkins as Honorary Chairman and Dr. Charles F. Kettering as Chairman and empowered the same to select what it believed to be the twelve outstanding American inventions. The task of choosing twelve peerless contributions to modern civilization made by citizens of the United States proved to be an extremely difficult undertaking. In fact, the Committee, in rendering its determinations, expanded the original twelve to nineteen and listed forty additional patents of outstanding merit. Following are the selections which may fairly be said to represent competent opinion as viewed from the vantage point of 1940:—

19 OUTSTANDING GREAT INVENTIONS

Air Brake
Airplane
Aluminum, Production of
Cotton Gin
Incandescent Lamp
Induction Motor
Linotype
Motion Picture Projector
Oil Cracking
Phonograph
Reaper
Sewing Machine
Steamboat
Telegraph
Telephone
Thermosetting Plastics (Bakelite)
Three Electrode Vacuum Tube
Typewriter
Vulcanization of Rubber

(Continued on page 26)

Resolutions Adopted

The Following Resolutions Were Adopted at the 20th Annual Convention of the New Jersey Society of Professional Engineers Held Recently in Newark

HIGHWAY DIVERSION

WHEREAS, Each year the Legislature of the State of New Jersey has diverted funds from Highway Revenues for purposes of Relief until the total approaches the sum of 100 million dollars; and

WHEREAS, The State Highways have far greater than their proper share of serious accidents; and

WHEREAS, The loss of this money to Highway improvement is blocking sorely needed Safety Construction; and

WHEREAS, Diversion has blocked alleviation of the Accident and Congestion Problem on Urban and Suburban Routes properly a part of a State Highway System, but which the State cannot take over due to the lack of funds; and

WHEREAS, The average highway construction worker earns less than $1,000.00 per year; and

WHEREAS, It is unfair and has proven unsound to finance relief out of the earnings of this low wage group;

NOW THEREFORE BE IT RESOLVED:

That the policy of Diversion of Highway Revenues be condemned as unsound;

That the Governor and the Legislature of the State of New Jersey be petitioned to end it; and

That the Revenue derived from the Highway User be invested in a safer and more economically sound Highway System.

AND BE IT FURTHER RESOLVED:

That the State Legislature be requested to enact legislation to amend the State Constitution to prohibit the diversion of dedicated monies.

AND BE IT FURTHER RESOLVED:

That copies of this resolution be sent to the Governor of the State of New Jersey and to the members of both houses of the Legislature.

RESOLUTION

WHEREAS, in spite of the excellence of the highway system of New Jersey, motor vehicle traffic problems especially through the Metropolitan New York and Philadelphia areas are ever becoming more acute, and

WHEREAS, the proposed Boston to Washington, D. C. super highway will serve those States from whom about one half of the Federal income is obtained, and will also relieve the intolerable traffic congestion now existing in this State,

NOW THEREFORE BE IT RESOLVED:

That this Society in annual convention assembled endorse the activities of the Superhighway Committee, and its Chairman E. Donald Sterner, State Highway Commissioner in promoting this much needed public improvement as a Federal Project, and that this Society make known its vital interests in this movement to the States Representatives in Congress.

RESOLUTION

(Proposed by Passaic County Engineers' Society)

WHEREAS, Topographic Maps are of inestimable value to most State, County and Municipal departments including the State Highway Department, State, County and Municipal Planning Boards, Water Policy Commission, State Department of Health, Sanitary Commission & Boards, Flood Control Projects, many Public Utilities and Engineers, and

WHEREAS, All of New Jersey north of latitude 40 degrees north should be accurately mapped on a scale of 2000 feet to the inch, and that the same scale should be used for the Camden metropolitan area and a strip along the eastern shore south of latitude 40 degrees north which would be wide enough to include Toms River and Pleasantville, and

WHEREAS, There is a public demand that this section of New Jersey be mapped and re-mapped,

NOW THEREFORE BE IT RESOLVED:

That the New Jersey Society of Professional Engineers in convention assembled hereby endorse such action and recommend that the New Jersey Legislature be requested to make an annual appropriation of $25,000.00 to the Department of Conservation & Development, with the understanding that the United States Department of the Interior appropriate a matched sum and furnish experienced men and equipment from the United States Geological Survey to carry on this highly important work, and

BE IT FURTHER RESOLVED:

That a copy of this resolution be forwarded to Governor A. Harry Moore, the President of the Senate and Speaker of the House, and the Director of the Department of Conservation and Development.

RESOLUTION

WHEREAS, the year 1939 has been one very deficient in rainfall and runoff, and

WHEREAS, Engineers have long predicted that water supplies would be adversely affected, and

WHEREAS, Serious shortages have occured in several areas in New Jersey this year, and

WHEREAS, The first step toward a logical plan for assuring adequate water is one of interconnecting existing systems, and

WHEREAS, A comprehensive plan for meeting the water needs of New Jersey has been shown to be one of both merit and necessity,

NOW THEREFORE BE IT RESOLVED:

That this Society in convention assembled endorse the action recently taken to install some of the more urgent interconnections of water systems, and

BE IT FURTHER RESOLVED:

That careful consideration be given both to additional useful interconnections and to plans for such additional supplies as may be required, and

BE IT FURTHER RESOLVED:

That the Governor of the State of New Jersey and the Legislature be urged to formulate and pass legislation to the end that adequate water may be quaranteed to our citizens, and

BE IT FURTHER RESOLVED:

That a copy of this resolution be sent to Governor A. Harry Moore, the President of the Senate and the Speaker of the House.

RESOLUTION

WHEREAS, the Riparian Stream & Waterway Survey, as now being conducted by the Work Projects Administration, under the Sponsorship of the State Water Policy Commission and the Board of Commerce and Navigation, has proven itself of inestimable value to State, County and Local Agencies, by providing them with accurate data on Streams, Shores and Waterways of the State, and

WHEREAS, it is deemed very important and in the best interests of the State, that this important work be continued until all the Streams of the State are accurately surveyed and mapped, and

WHEREAS, the Federal Congress requires that the Sponsors of the project contribute towards its cost,

NOW THEREFORE BE IT RESOLVED:

That this Society hereby goes on record as approving this work and that it urge the Governor and the Legislature of the State to provide the necessary funds to enable its agencies, the State Water Policy Commission and the Board of Commerce and Navigation, to make the necessary contributions to ensure the continuance of this most worth while undertaking,

AND BE IT FURTHER RESOLVED:

That a copy of this resolution be sent to Governor A. Harry Moore, the President of the Senate and the Speaker of the House.

RESOLUTION

BE IT RESOLVED, that the New Jersey Society of Professional Engineers in Convention assembled, January 13, 1940 express to

Thomas F. Joyce, Vice-President, R.C.A. Manufacturing Co.,
James E. Logan, Chief Engineer, State Highway Department,
Ernest H. Rigg, Naval Architect, New York Shipbuilding Corp.
Dr. Frederick S. Goucher, Bell Telephone Laboratories, Inc.,
Dr. William D. Ennis, Stevens Institute of Technology,
Professor Albert R. Johnson, Rutgers University,
Honorable E. Donald Sterner, State Highway Commissioner,

its very sincere appreciation for the instructive and interesting presentation of their subjects, and be it further

RESOLVED, that copies of this Resolution be forwarded by the Secretary to the above mentioned speakers.

RESOLUTION

BE IT RESOLVED, That the New Jersey Society of Professional Engineers express its sincere appreciation to the Exhibitors and Advertisers for their generous support to this, our 20th Annual Convention.

RESOLUTION

Appreciation to the Management—ROBERT TREAT

WHEREAS, One of the most important factors contributing to

the success of this the 20th Annual Convention, has been the wonderful co-operation and thoughtfulness of the Management and Personnel of the Robert Treat Hotel, therefore,

BE IT RESOLVED, that a vote of thanks be given by the members here assembled, to the Management of the Robert Treat Hotel, and

BE IT FURTHER RESOLVED, that a copy of these resolutions be sent to the hotel as an expression of our appreciation.

RESOLUTION

Extending appreciation of the efforts of the Convention Committee,

WHEREAS, This the 20th Annual Convention of the New Jersey Society of Professional Engineers stands out in the history of the Association as one of the most successful, and

WHEREAS, Only through untiring efforts, personal sacrifice loyalty and initiative, could this remarkable result be obtained, therefore,

BE IT RESOLVED, That the members of the Association assembled here in the 20th Convention give a rising vote of thanks, and appreciation to the Convention Committee, its tireless Chairman, George W. Andress, and to the Essex County Engineering Society, for having through their efforts made this such a distinct success.

RESOLUTION

WHEREAS, the year 1939 brought problems of unusual difficulty and controversy in the conduct of the affairs of this Society, and

WHEREAS, the service of our President, Spencer C. Hamilton, Jr., throughout this period has been characterized by courage, fairness and complete devotion to the interests of this Society and to the Professional Engineers and Land Surveyors of this State, now therefore, be it

RESOLVED, that this Society, by a rising vote, gratefully acknowledges his untiring efforts in maintaining the integrity and objectives of our organization.

George F. Randolph, *Chairman*
Resolutions Committee

Engineer To Become President Of Rotary International

Armando de Arruda Pereira is "the president nominee" of Rotary International, to serve as president during the year 1940-41, according to an announcement in the April 5th *Rotary International News Letter.*

Inasmuch as no other candidate for the presidency had been presented for consideration by April 1, Rotarian Pereira's nomination is tantamount to election, the acual election to take place at the 1940 Rotary convention to be held in Havana, Cuba June 9 to 14.

Senhor Pereira is a graduate of the Polytechnic School of Sao Paulo, of the Birmingham (England) University, and of the New York University; is a Director of the Institute of Engineering of Sao Paulo, and a Fellow of the Royal Academy of Arts of London. He has been active in Rotary International as district governor, committee member, and second vice-president.

Are Written Examinations Justified?

(Continued from page 4)

It is not a serious reflection on a candidate if he fails to pass the entire examination on the first trial. It is a strenuous ordeal and allowances should be made for the fact that it is a new experience. However, in view of the fact that unless a candidate failed more than half of the examination he had to repeat only the parts tailed, tailure to pass on the second trial is rather serious. I therefore believe that if only 61.3% of all graduates passed after two trials and 21.6% still failed after repeated trials, we are justified in refusing to exempt college graduates from the examinations. Reflecting on this I made a detailed study of the grades made by the individual men and found that 15.6% of the graduates and 18.9% of the seniors, after several trials, were still so far below passing that I feel sure they never should have received their degrees. Apparently these men would not have been able to pass any reasonable comprehensive examination a college might give as a requirement for graduation."

* The statistics given by Mr. Olmsted are singularly paralleled to those of the California Board.

(Reprint from "The Registered Civil Engineer," a news bulletin published by the California State Board of Registration for Civil Engineers.)

THIRTEENTH ANNUAL CONVENTION

of the

NEW YORK STATE SOCIETY OF PROFESSIONAL ENGINEERS, INC.

FRIDAY, MAY 24 and SATURDAY, MAY 25, 1940

at the

HOTEL COMMODORE, NEW YORK CITY

ANNUAL MEETING—10 A. M. SATURDAY

LUNCHEON—1 P M. SATURDAY

The program of the Convention is as follows:

Friday, May 24th, 1940

2:00 P. M. Registration.

3:00 P. M. Committee Conferences.

4:00 P. M. Meeting of the Executive Board.

6:30 P. M. Dinner for the Executive Board.

Saturday, May 25th, 1940

9:30 A. M. Registration.

10:00 A. M. General Meeting of the New York State Society.

1:00 P. M. Luncheon

The General Meeting to reconvene after Luncheon.

Special arrangements have been made for the entertainment of the Ladies while the Business Meeting is in session.

I. W. Conway is chairman of the convention committee and F. Van Olinda is secretary of the society. Frederick Zurmuhlen is president.

Question of Unionism for Engineers

(Continued from page 9)

to by poorly disguised and open antagonism to their professional aspirations.

If his legitimate ambitions are thwarted, the beneficent attitude of the engineer may be changed and he is not unaware of the latent power of his profession and the potency of cooperation and unionism.

It is to be hoped for the good of the nation, its facilities, its people and the profession of engineering itself, that the path of professional recognition and unity for its engineer be not made too difficult particularly by those who are the chief benefactors of his professional advancement.

MORE CONVENTION NEWS

There will be presented in succeeding issues of THE AMERICAN ENGINEER additional activities of the National Society of Professional Engineers' convention held in Columbus, Ohio recently.

Included will be addresses by some of the guests.

National Secretary Completes Tours

Our National Secretary, Edward Larson, has just completed two trips to the middle west in the interest of N.S.P.E.—one the end of March and the other late in April.

One of the highlights of the latter trip was a dinner meeting with Oscar Kisa, in Milwaukee, during which possibilities were discussed for the organization of a new State Society of Professional Engineers in the state of Wisconsin.

Mr. Larson also attended the State Convention of the Michigan Society of Professional Engineers, and met with the officers, board members and section chairmen of the Illinois Society to discuss plans for next year's national convention to be held in Chicago.

Past President Ford, Editor Craig, Illinois State President Gayton, and National Directors Morgan and Tuttle, of Illinois and West Virginia respectively, were also visited by Secretary Larson.

On April 26th, he met with the Board of Direction of the Ohio State Society, and committee chairmen, functional section chairmen, and officers of local chapters throughout the State.

April 29th, Mr. Larson met with a group of engineers from the Board of Direction of the Kentucky Society of Professional Engineers at Lexington, Kentucky; and on April 30th, with the Board of Directors of the West Virginia State Society.

He returned to Washington to prepare for a meeting of the Board of Directors of the National Society of Professional Engineers which was held Saturday, May 17th. A report of this meeting is available to your National Director, whether or not he attends, so that there should never be a lack of news pertaining to N.S.P.E. activities.

Sesquicentennial Celebration

(Continued from page 23)

40 INVENTIONS OF OUTSTANDING MERIT

Automatic Glass Machine
Automatic Screw Machine
Barbed Wire
Calcium Carbide
Car Coupler
Carborundum
Cash Register
Celluloid
Colt Revolver
Corliss Valve
Curtis Steam Turbine
Edison Three Wire Transmission System
Electric Precipitation
Electric Welding
Elevator (Otis)
Francis Hydraulic Turbine
Gyro Stabilizer
Harvester
High Speed Tool Steel
Inductance Loading Coils for Telephone Circuits
Mercury Vapor Lamp
Milling Machine
Nail Making Machine
Polyphase Electric Distribution
Profile Lathe
Pullman Car
Radiotelephony
Rail Mill (Fritz)
Refrigerated Car
Rotary Printing Press (Hoe)
Self Starter
Shoe Machinery
Slide Fastener
Stanley Transformer
Steel Plow
Submarine
Transparent Flexible Photographic Film (Goodwin)
Trolley Car
Tungsten Lamp
Turret Lathe

A few of the inventions, listed above, actually originated outside of the United States. They have been included because an American contribution was necessary to make them practical and of commercial value. In all other cases, the invention is wholly or distinctly American in origin.

The National Society of Professional Engineers participated actively in the Sesquicentennial celebration. President John C. Riedel had the distinction of being a member of the National Committee which selected the inventions listed as "great."

Address by C. W. Post

(Continued from page 15)

1932	27.6%	62.4%
1934	31.8%	68.2%

He found 1/3 of all engineers and 2/3 of the Civil Engineers on the public payroll. In that same period, he found the independent consulting engineers decreased in number and represent less than 5% of the profession. In the State Operations Division, out of a total of 136 employees, 29% are licensed professional engineers.

The trend of W.P.A. operations has been to decrease the number of social workers—to increase the number of engineer worker—to decrease the number of boondoggling projects—to increase the number of worthwhile construction projects.

Congress has decreased the amount of money appropriated and regulations have decreased the number of workers.

In my opinion, the country will continue to have a work relief program to give aid to the unemployed. Many professional people have benefited by it, none more so than the engineers. Hence, as a professional group, you should take advantage of the situation and see to it that in your locality the work is carried out in a workmanlike manner. In doing so you should be fortified with these facts: First, remember that the work is being done at the request of your local officials; second, by persons furnished from the relief rolls by your local welfare officer; third, the money paid is referred to as the Security Wage.

Lester W. Herzog, State Administrator, has been identified with Public Works and the construction industry for many years. He knows the shortcomings of public work—the frailty of human endeavor—the enthusiasm with which people pull down character and indulge in that famous indoor sport of criticizing public officials. Therefore, in this engineering group which is so integrated with public works, your investigation of W.P.A. operations—your suggested methods of carrying out Congressional action, is invited. We believe it within the scope of the profession to view the public work in its broad aspect—to weigh the public interest and, if you conclude the work is of an inferior character, the State Administrator will welcome your views to the end that he may improve the work wherever possible.

Engineer's Responsibility Toward The Engineering Profession

(Continued from page 10)

from a monetary standpoint. In engineering positions in this State and largely in its municipalities, necessary qualifications for progress and perhaps limitations to progress have been fixed for a long time by Civil Service. That perhaps is the reason that the engineer in Civil Service employ is so prone to ask the question—Why should I, in a sense, dilute my efforts to obtain recognition by maintaining a membership in more than one organization? He is, at least, temporarily blinded to the extent that he does not realize that the existence of the licensing law alone would not have increased his prestige to any extent without concerted organization.

The Civil Service Department sets up qualifications and gives tests for practically all public servants with the exception of laborers. This is a large field of endeavor and with their limited personnel it is impracticable to have an expert in each field or class of service. This is especially

true in the professions. The acts of the Civil Service Department, whose constant aim is to improve the quality of State service, are increasingly subjected to legal and judicial review. Even if they were able to depend on an expert in each field of endeavor, our courts would, quite naturally receive other expert testimony from other sources. The latter may be given possibly equal or more weight by the courts than the testimony of a departmental expert. It is in this particular phase of the work that the State Sociey of Professional Engineers may be helpful by giving their approval and endorsement to certain minimum qualifications as, by so doing, the weight of evidence submitted by it may be conclusive, at least, to the point it might outweigh specific criticism.

We live in a land of increased legislative, executive, and judicial regulations and control. Few, if any, members of these different bodies are engineers. Contrast this, if you please, with the number of legally-trained members in the different bodies and you will almost immediately discern the very great need of an effective organization to give the public a correct picture of the qualifications of the engineer and so that they may become a matter of *common knowledge*. In public service, the Department of Civil Service is carrying a large part of this load at the present time. As individual employees, we are asking them to raise the standards of service, especially professional service, and we owe it to them and to ourselves to give them our undivided support. Ways and means of doing so have just been placed at our disposal. Our approval of their engineering requirements, including licensing, and our support will give them proper standing both before courts of review and before the bar of public opinion. That such an outcome will increase the quality of service rendered the State, there can be no question. As citizens, that is our first concern.

Many engineers in classified service—too many in fact, seem to feel that whenever a specific emergency may arise enough engineers will rally to their support to accomplish the purpose. In this kind of thinking, they fail to heed history—current or mediaeval. The other professions know that their progress in organized society require concerted effort in the first instance but to preserve such progress greater efforts are constantly necessary. This can be visualized by efforts of legislation that is constantly making its appearance at each session of the Legislature. Engineers should ask themselves if they could meet this as individuals and if they are true engineers their answer must unquestionably be "No."

While perhaps not taught in our modern school curriculum, it is a matter of common knowledge that every man owes something to society for his privilege of leading a normal life. Society, in turn, must give due consideration to the qualifications, aims, and judgment of groups which comprise it. To my mind, every engineer in classified service owes fully as much, if not more than his fellow engineers, to society for the very simple reason that he is not only a citizen but a public servant. As such, his contacts with the public are reasonably constant and, by virtue of them, he can enhance his standing, obtain increasing respect and confidence of the public, and history has shown that this can best be done by some kind of organization. The Society of Professional Engineers offers that throughout the land and those engineers in public employ owe that Society allegiance and support. Failing this, his status will lapse to that of the past decade and with results that are well known to all. If he does not respect and promote such organization, he cannot expect the uninformed to respect his qualifications, let alone promote and advocate them, as they do in other professions.

The Need For Greater Appreciation

(Continued from page 7)

employed were often not engineers at all. When he went on one job in the early days all the tangents were graded but no curves because there was no one on the job who knew how to lay them out. The business men who built the railroads in the early days often had no conception of railroad engineering nor even the need for engineers.

John F. Stevens in his "Recollections" points out how financial control and operation of the New Haven Railroad rather than engineering control resulted in expansion schemes for making money rather than improvement of service and economical operation. He stated, "I cite these instances to indicate that an expansive view of finance coupled with ability to borrow money cannot successfully run a railroad." [4] This statement is applicable to-day to many activities besides railroading. The wrecking of the New Haven is not a nice story but it illustrates management by financiers for the profit of the management and not management by engineers for the benefit of service to the public.

These examples are given because they happened long enough ago to become more or less impersonal. There is no intent to imply that the railroads are today mismanaged nor even that their present difficulties are in a large measure the result of mismanagement. The story illustrates what has happened in one of our most important civil engineering fields and brings home a general principle which all engineers must understand and teach, namely that the engineering point of view cannot be disregarded but must be represented in the management of our great engineering enterprises if the engineering ideal is to be attained.

Engineers sometimes have to combat the so-called learned professions of law and medicine in the administration of activities in which precedent alone gives them authority but which are definitely within the field of the engineer. An example is found in municipal and public health administration. Consider the field of sanitary engineering. The operators of our water plants are often absolutely untrained. They know how to throw the switches and open and close valves when they start on the job and that is about all. Slowly, if they are retained long enough, they learn to make a few necessary repairs and even make a good show as far as the public can see in operating their plants. Frequently we find controllers and motors out of service merely because the operator does not know how to operate them. Technical men if they occupied these positions for the same length of time could easily tune up the plant to higher efficiency, reduce the consumption of supplies and control operation to insure an absolutely safe and potable water at all times. In some plants such men, technologists, have made changes in the scheme of operation and later in the construction of their plants which have improved the quality of the water and have saved many times their own salaries. Clearly here is a place for the engineer. In Indiana there are about 35 registered engineers operating 312 water and 75 sewage plants. Thirty-five out of 387. About 130 of these water plants serve communities of 1,800 or more and many of these plants are large enough to employ more than one engineer. This is a public health problem as well as one of economics. The operator is responsible for the quality of the finished water and the proper handling and conservation of a large investment in plant facilities, yet engineers are not employed. The reasons are many. The man now holding that job does not wish any change. There you have the opposition of the untrained laboring element. The politician who appointed him does not wish it because he needs the operator's support (or had it) at the polls. The

lawyer or business man who is head of the Board of Works does not wish it, perhaps because he desires to be the one man with brains in the organization, perhaps because he too is interested in votes. The health officer, always a physician, does not wish it because he is not interested or informed enough in real public health problems and their proper solution to appreciate the value of trained men in a water or sewage plant. The uninformed or misinformed taxpayer does not wish it because he is opposed to anything that appears to increase operating costs. He has been advised by the taxpayers associations headed by bankers, financiers and other business men or by the politicians or by the press that an increase in cost is bound to result if competent, trained men are employed. The salary on the payroll can always be seen but the savings and the intangible improvements are not so evident.

At a recent meeting a representative of the United States Public Health Service said in effect that in his organization there is a constant conflict of opinion between the physicians on the one hand and the engineers on the other. The doctors have the inside track and they naturally seek to divert the available funds to those fields in which the sanitary engineers are authorities. This public organization does less in the real promotion of public health than it might if engineers were given a proper measure of authority. This comes from one engaged in the service.

Quite an appreciable percentage of the work of our state departments of health is of an engineering nature and in many instances the percentage should be larger and yet practically all boards are made up of physicians with an occasional surgeon or dentist.

In state, county and city engineering positions it is not uncommon to find engineers responsible for large construction programs whose remuneration is in no sense commensurate with their responsibilities. In many cases this has resulted in direct financial loss to the taxpayer. An engineer in charge of projects running into millions can save many times his salary if he is experienced and competent. One per cent on a million dollar contract is not a large saving and yet it will go a long way toward paying for competent service. It is not uncommon to find a $5,000 chief engineer matching wits with a $15,000 contractor's superintendent and an $1,800 inspector in the same contest with the same superintendent or his $3,600 foreman. Much money can be saved by more careful preliminary studies and more complete and comprehensive plans and specifications. In one case the plans for a $20,000,000 sewer system were completed and the thoroughness of the engineer in charge led him to make a reinvestigation and redesign which resulted in a savings of two per cent, a saving of $400,000 which repaid many times the engineering costs involved.

Those examples have been cited because they can be repeated in scores of cases. Perhaps in many the public health hazard is not involved but certainly the public welfare and the proper expenditure of public funds are. County surveyors, city engineers, P. W. A., W. P. A., C. C. C., N. Y. A., state engineering agencies and so forth through the whole gamut of public agencies engaged in engineering work offer similar examples. Some of these criticisms such as the advisability of more engineering work on plans and specifications and higher salary scales to secure competency may apply to the consulting engineers themselves.

In private industry it is frequently the same story. In only a few cases have engineers had a voice in the management of the railroads, built by engineers, except in minor capacities.

The engineer is contributing to the spread of knowledge, to economics, ethics, sociology and in fact to the destiny of the race and he should make for himself a larger place in its council chambers.

In order to determine what can be done about it we should make a careful study of ourselves and our shortcomings. When we have recognized the problem and corrected our deficiencies where they exist the battle will be half won.

First, unfortunately, many engineers have become stagnant, and ceased to grow. They themselves are to blame for their failure to advance. When the opportunity to advance arises they are not ready to step up. They have not prepared themselves for the next job.

Second, too many engineers are so interested in technology, the mechanics of the job, that they have no time for, or even interest in, the larger phases of engineering practice. Many executives are looking for engineers who have an alert type of mind, good in technology, but who have also developed a proper sense of values and sound judgment and the ability to deal with men and to express their ideas forcefully and convincingly; in fact men who realize that they should concern themselves with more than the technical phases of their jobs. It is true that we are constantly confronted with new knowledge and new subject matter and it requires much reading and study to keep abreast of the times, yet we must do this and develop in the other lines also. Successful men are those who have an excess of energy and are natural self starters.

Third, the engineer must interest himself in politics in its broadest sense both as it relates to government and as it relates to his job. Political acumen is a valuable asset.

Fourth, the engineer must see to it that he makes an impress on his associates outside of his profession and upon the public and their representatives. He must not hide his light under a bushel but see to it that it is in the open for all to see and appreciate. Professional engineers have been too modest. This does not mean personal advertising, "tooting our own horns," but rather a dignified emphasis on the accomplishment of engineering in completed projects and going concerns, the importance of engineering to the social order, the absolute necessity and economy of engineering competence and the abilities of engineers in the fields of management of public affairs, industry and even business especially where these fields involve technology. There the engineering point of view is important and it is a definite loss to society not to have it expressed.

Fifth, the engineer needs a renewed sense of social responsibility. He has been unable to exert his full influence on society in an effective way because sufficient authority has been withheld from him by society itself. This can only be overcome by a vigorous campaign in which the engineer fights shoulder to shoulder with his colleagues in all their organizations to wrest from society the authority which is rightfully his. That fight is a part of his social responsibility.

Engineers, engineering teachers and engineering students must be progressive, not static; broad in their interests, not merely technical, and they must be concerned with politics; they must be resolute, united and convincing in presenting their views on engineering matters to the public and in pressing their claims to authority; and finally they must be vigorously coperative with all other agencies in promoting the public welfare.

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